GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Miconia calvescens***

Miconia calvescens 简体中文 正體中文 **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Myrtales	Melastomataceae

Common name miconia (English), cancer vert (English), cancer vert (French), velvet tree (English), purple plague (English), bush currant (English)

Synonym *Miconia magnifica* , Triana 1871
Cyanophyllum magnificum , Groenland 1859

Similar species

Summary Miconia calvescens is a small tree native to rainforests of tropical America where it primarily invades treefall gaps and is uncommon. Miconia is now considered one of the most destructive invaders in insular tropical rain forest habitats in its introduced range. It has invaded relatively intact vegetation and displaces native plants on various islands even without habitat disturbance. Miconia has earned itself the descriptions “green cancer of Tahiti\" and “purple plague of Hawaii\". More than half of Tahiti is heavily invaded by this plant. Miconia has a superficial root system which may make landslides more likely. It shades out the native forest understorey and threatens endemic species with extinction.

view this species on IUCN Red List

Species Description
Miconia calvescens is a woody invasive shrubby tree capable of reaching 15m in height; however the majority of specimens in the Society Islands are 6 to 12m tall, with slender, vertical stems (Meyer 1996). The leaves are opposite, elliptic to obovate, usually 60 to 70 cm long (sometimes up to one meter long). A prominent feature of the leaves is the three prominent longitudinal veins. The bicolorous form of the plant has dark green leaves on top with iridescent purple undersides. The inflorescence is a large panicle comprised of 1000 to 3000 white or pink flowers. Berries are 6-7 mm in diameter and purple to black coloured when ripe.

Notes
1. *Miconia calvescens* is referred to as miconia in this species profile which should not be confused with the genus *Miconia*.\r\n
2. Invasions of Tahitian rainforests by *M. calvescens* dramatically accelerate after damage and disturbance caused by cyclones (Merlin & Juvik 1995, in Murphy *et al*. 2008b).\r\n
3. There are 15 invading melastomes described for Hawaii (Almeda 1990, in Baruch Pattison & Goldstein 2000), including the forest tree *M. calvescens*, the shrub *Clidemia hirta*, and the herbs from open sites, *Arthrostema ciliatum* and *Tibouchina herbacea* (Baruch Pattison & Goldstein 2000). \r\n
4. According to botanists studying the tropical Americans miconia \"never [...] occurs in monospecific formations\" in its native region (F. Almeda, in a letter dated November 1988 to P. Birnbaum, in Meyer 1998b); this is in stark contrast to its growth form in introduced regions. P. Morat (director of the Laboratoire de Phanerogamie of the Natural History Museum of Paris) considered that, with only some 40 herbarium specimens present in Paris, this species has been little collected and in its native countries \"is obviously a very banal species\" (letter dated September 1988 to J. Florence, in Meyer 1998b)

Lifecycle Stages
In a laboratory, some seeds germinate within 15 to 20 days when exposed to light and moisture, but others remain dormant (Meyer 1996). Data from Maui suggest that seed banks lie largely dormant under normal shaded conditions but are stimulated by the opening of the canopy (HEAR 2005). Laboratory experiments indicated that the seeds of *M. calvescens* are able to germinate in a large range of light conditions (even at 0.02 % of full sun and at R/FR = 0.5) but not in complete dark (Meyer 1994, in Meyer & Malet 1997). Moisture is a limiting factor and viability decreases rapidly when seeds are stored in dry conditions (Meyer 1994, in Meyer & Malet 1997). The soil seed bank may reach greater than 50 000 seeds/m². Longevity of the soil seed bank in Raiatea (French Polynesia) has been documented to reach at least 15 years (Meyer pers. comm., in Hester *et al*. 2010).

Uses
Also known as *Miconia magnifica* in horticulture, miconia has attractive bicoloured foliage and enormous inflorescences comprised of panicles of up to 3000 white or pink flowers that made it a highly attractive ornamental plant. When the alarm was raised against miconia in Hawaii in 1991-1992 (e.g. Gagné *et al*. 1992), all 1000+ spp. of the genus *Miconia* were declared noxious and prohibited under Hawaii's Noxious Weed regulations, with the aim of preventing problems with other species in the genus. The entire family Melastomataceae is considered notorious for its perceived high percentage of invasive members (Meyer and Medeiros 2010).

Habitat Description
Miconia calvescens thrives in tropical montane climate regimes; it is capable of establishing in areas that receive at least 1800-2000 mm of rain per year. It grows in lowland to montane tropical rainforest at altitudes between 300 and 1800 meters. Preferred microsites include mineral soil, dead tree boles and dead tree fern trunks.

Reproduction
The success of *Miconia calvescens* as an invasive plant is partly due to its prolific reproduction, with one mature tree flowering up to three times per year and bearing\r\nup to 200-300 inflorescences that can produce more than 200 fruits each with 25 to 200 seeds per fruit (Medeiros *et al*. 1997; Meyer 1998a). Under favorable conditions, juvenile specimens can grow up to 1.5 meters per year (Meyer and Malet 1997) and reproduce when four to five years old (Meyer 1996). Full-sized trees (greater than eight meters tall) can flower two to three times a year and producing about two to three million seeds each time; flowering appears to be triggered by weather conditions (Medeiros *et al*. 1997). A young tree with only two panicles can produce ca. 200,000 seeds in its first fruiting season, whereas an older tree with over 50 panicles can produce over 5 million seeds per annum (Meyer 1998b). Production of a large amount of seeds and their remarkable longevity of up to 15 years or more (Meyer pers. comm., in Hester *et al*. 2010) results in the availability of seeds in the seed bank for germination when conditions are optimal. In addition, the large quantity of seeds enables easy dispersal by humans and other animals. Bird dispersal is overwhelming the most important mode of dispersal at the local level, but transport by humans has repeatedly led to large jumps in miconia distribution (e.g. Murphy *et al*. 2008b).

Nutrition
Miconia calvescens plants can tolerate otherwise poor growing conditions if adequate moisture is available.

General Impacts
Miconia is one of the most destructive invaders in insular tropical rain forest habitats. It is a serious threat to ecosystems in the Pacific because of its ability to invade intact native forests. Miconia has earned itself the descriptions such as the “green cancer” of Tahiti and the “purple plague” of Hawaii. Once miconia is established at a certain place it drastically changes the ecosystem and biodiversity of that environment.\r\n\r\n\r\n
Physical disturbance: Invasion by miconia has eliminated native forest understorey vegetation, increasing rapid runoff and potential for soil erosion and landslides on steep slopes. \r\n\r\n\r\n
Modification to Hydrology: Dense stands of miconia may damage watershed functions; there may be a significant change in the water balance, with an increase in runoff and a potential reduction in groundwater recharge, but this plausible result has yet to be fully investigated and documented (Burnett *et al*. 2006).\r\n\r\n
Economic/Livelihoods: Potential (as yet hypothetical) losses from an invasion of miconia on Oahu to groundwater recharge may conceivably be as high as $137 million per year (Kaiser and Roumasset 2002, in Burnett *et al*. 2006). Increased sedimentation could likely incur surface water quality damages; potential costs for Oahu have been estimated to be almost $5 million per year (Kaiser and Roumasset 2000, in Burnett *et al*. 2006). Comparable damage is possible on other Hawaiian islands, though the greatest economic impact is likely to be on Oahu, where 85% of Hawaii’s population is located.\r\n\r\n
Agricultural: Control programs underway since about 1995 have prevented significant agricultural impacts in the Hawaiian Islands. Invading miconia in ranchland near Hana, Maui in 1995-2000 was successfully removed. Theoretically, runoff from miconia stands could trigger erosion and loss of agricultural soil fertility (Chan-Halbrendt *et al*. 2007), but this has not yet happened or at least has not been documented.\r\n\r\n
Competition: When compared with a large group of native species *M. calvescens* appears to be better suited to capture and use light, which is consistent with its rapid spread in Hawaiian environments (Baruch Pattison & Goldstein 2000). Invasive characteristics of the species include rapid growth, fairly early maturity (after four years or more), production of large quantities of fruits and seeds, and effective seed dispersal by birds.\r\n\r\n
Threat to Endangered Species: In Tahiti, 70-100 native plant species, including 35-45 species endemic to French Polynesia, are directly threatened with extirpation by invasion of miconia into native forests (Meyer and Florence 1996).\r\n
Hawaii is home to a great number of rare and endemic plant, bird and invertebrate species at risk of global extinction, including over 350 federally endangered species. Upper Kipahulu Valley of Haleakala National Park on Maui, Hawaii, is a prime stronghold of Hawaiian biodiversity, containing stands of ohia (*Metrosideros polymorpha*) and koa (Acacia koa) that provide the primary habitat for rare native Hawaiian plants, birds and insects. Proactive response of Haleakala National Park personnel originally triggered a community-wide response to the miconia invasion in Hawaii about 30 years after *M. calvescens* had first been introduced to the State.

Management Info
For a detailed account on the management of the spread of *Miconia calvescens* please read: *Miconia calvescens* (Miconia/Velvet Tree) Management Information. The information in this document is summarised below.\r\n
Preventative measures: A Risk Assessment of *Miconia calvescens* for Hawaii and other Pacific islands was prepared with a resulting score of 14, meaning it is likely to cause significant ecological or economic harm in the Pacific. Csurhes (2008) has prepared an assessment for Australia.\r\n
Biological Control:\r\nA range of fungi, weevils, leaf-feeding beetles, nematodes, wasps, butterflies and moths have been found in South and Central America which damage miconia. . In miconia's invaded range in Hawaii, the non-native Chinese rose beetle (*Adoretus sinicus*) can cause up to 50% defoliation on individual leaves, but it has never been widespread and has never been observed to cause mortality (Medeiros *et al*. 1997). The high level of host specificity of the leaf-defoliating sawfly (*Atomacera petroa*) makes it a good potential control for *M. cavescens* (Badenes-Perez & Johnson 2007a). Since miconia seeds are dispersed by birds, fruit- and flower-eating insects including could help manage this weed (Badenes-Perez & Johnson 2007b). A fruit-feeding gall wasp (*Allorhogas* sp.) and a fruit-feeding beetle (*Apion* sp.) were evaluated for host specificity in Brazil by Badenes-Perez and Johnson (2007a). Other natural enemies (especially insects) are currently being sought in Brazil (since 1995) (please see Seixas Barreto & Killgore 2007 for further information), Costa Rica (please see Picanco *et al*. 2005 for further information), the Dominican Republic and Ecuador.\r\n
Legislation: Laws prohibiting the sale of *Miconia calvescens* in Queensland was passed in 1997 (Cshures 1998).\r\n
Education and Awareness: \"Ho'ike o Haleakala\" is an environmental education curriculum specific to Maui, produced by a partnership of school teachers, agencies, and community organisations, led by Haleakala National Park (Loope Starr & Starr 2004). The curriculum is available online (www.hear.org/hoike). \r\n
A growing interest of the public on Maui in meaningful hands-on ecological restoration projects is partially related to a growing interest in the heritage of the native Hawaiian people and proliferation of potential volunteer projects (www.hear.org/volunteer/maui/). Volunteers participate in a number of restoration projects, including one involving endangered dry forest plant species on private lands (Loope Starr & Starr 2004). \r\n
Campaigns to inform the public of the threat of miconia, including fliers and media coverage, were launched in the Society Islands (Meyer & Malet 1997).\r\n
Integrated management: Combining physical removal with chemical treatment has been employed to control miconia in the Society Islands. Trees (greater than four to five meters) were cut with a machete or a small chain saw and herbicide was systematically applied to the exposed stumps to prevent resprouting. After several trial with different herbicides, Gbnoxone (Triclopyr + 2,4-D) in diesel solution (one liter per 20 liters) applied carefully to cut stumps provided effective control with few resproutings compared with other chemicals used. 2,4-D is also said to be one of the most acceptable chemicals from an environmental point of view since it is not residual (Meyer & Malet 1997).

Pathway
Transportation of dirty machinery and vehicles to the remote islands of Nuku Hiva and Fatu Hiva (Marquesas Islands, French Polynesia) is suspected to have spread *Miconia calvescens*. It was also introduced to the island of Tahaa (French Polynesia) in the early 1980s, probably with infested soil on the wheels of bulldozers used for road construction (Meyer 1998b).*Miconia calvescens* has been and is present in botanical gardens around the world.*Miconia calvescens* seeds or seedlings may be transported along with soil to new locations (Meyer & Malet 1997).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Lloyd Loope, USGS, Maui, Hawaii, USA

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ALIEN RANGE

[1] ALGERIA
[2] AUSTRALIA
[1] DOMINICAN REPUBLIC
[1] GERMANY
[1] INDONESIA
[1] NETHERLANDS
[1] PHILIPPINES
[1] SRI LANKA
[6] UNITED STATES
[1] ANGOLA
[1] BELGIUM
[9] FRENCH POLYNESIA
[1] GRENADA
[1] JAMAICA
[2] NEW CALEDONIA
[1] REUNION
[1] UNITED KINGDOM

Red List assessed species 4: EX = 1; CR = 3;

Moho bishopi **EX**
Pomarea nigra **CR**
Myrsine longifolia **CR**
Psittirostra psittacea **CR**

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Summary: On Tahiti, invasive species such as the carnivorous snail Euglandina rosea or the tree Miconia calvescens; have impacted much of indigenous species or habitats, even in remote places not affected by agriculture or development. However, thanks to the extreme ecological conditions in altitude, these invasive species have not reached higher elevation where patches of native vegetation with endemic flora and fauna still occur. On Mount Aorai, second highest peak of Tahiti (2066 m), the impact of Euglandina rosea and Miconia calvescens reach a maximum altitude of 1400 m. Above this altitude, endemic gastropod species are still found alive and some remain undescribed. A new genus of Vertiginidae, Nesoropupa n. gn., is described for four new species from the top 500 m of Mount Aorai and Mount Marau: N. duodecim n. sp. (type species), N. fenua n. sp., N. nathaliae n. sp. and N. fontainei n. sp. Also discussed is how the impact of global warming is allowing introduced species to colonize higher altitudes up to the summits. /p
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Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from:
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