

*Morella faya*  

**System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Myricales	Myricaceae

**Common name** firebush (English), Feuerbaum (German), candleberry myrtle (English), fire tree (English), fayatree (English)

**Synonym** *Myrica faya* , Ait.

**Similar species**

**Summary** *Morella faya*, commonly called the fire tree, is a native to the Azores, Madeira Islands and the Canary Islands. It has been introduced to several places including Hawaii, New Zealand and Australia. This fast growing tree, whose dispersal is facilitated by introduced frugivorous birds, is capable of rapidly forming dense stands and has a negative effect on the recruitment and persistence of native plant species.



[view this species on IUCN Red List](#)

## Species Description

The fire tree is an evergreen shrub or small tree that usually grows around 8 metres tall. It has been reported as growing to heights of approx. 17mtrs (50 feet) in some areas (Benton, 2002). Stem and branches of the fire tree are covered with reddish peltate hairs. Leaves are coriaceous, oblanceolate, 4-11cm long, 1-2.5cm wide, and have glandular dots that are inconspicuous (PIER, 2002). Leaves are dark green, shiny, smooth, aromatic, and alternate along the stem. Flowers are usually branched catkins borne among leaves of the current year's growth. Male flowers have four stamens and occur in small hanging clusters near the branch tip. Female flowers, also grouped in small hanging clusters, occur in threes, further from the branch tip. Fruits of fire tree are small, and red to purple when ripe (Benton, 2002). *M. faya* is considered to be dioecious, but "male" plants still produce some fruit and "female" plants a few male inflorescences (PIER, 2002).

## Notes

The time-lag between the lava flow formation and *Morella faya* colonisation appear to be much shorter on Hawai'i than on the Azores, (Binggeli, 1997). *M. faya* has several characteristics of a successful invader including its early reproduction, rapid growth, ability to fix atmospheric nitrogen, high fecundity and dispersal by frugivorous birds. In Hawai'i the main dispersal vector is a non-native silver-eye, *Zosterops japonica*, of which there are 3 species in Australia with wide ranges. Should *M. faya* become naturalised in Australia these bird species would be the most likely dispersal vectors.

## Uses

Probably used as an ornamental or medicinal plant. In Hawai'i, Portuguese labourers made wine from the fruit. (Binggeli, 1997)



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FULL ACCOUNT FOR: *Morella faya*

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## Habitat Description

Fire tree is known to adapt to a wide range of habitats and soil types. In Hawai'i it has invaded wet and mesic forests where it forms dense, monotypic stands, it is reported to be spreading over drier sub-montane forests (D'Antonio and Mack, 2001) It occurs in recent volcanic cinder deposits and various types of native forest, and is most abundant on steep slopes, in seasonal montane forests, pastures, and roadsides (Benton, 2002). In Volcanoes National Park in Hawai'i, the main infestation occurs at 1250m, and although it rapidly forms dense monotypic stands it does not readily invade closed, late-successional native forest (Binggeli, 1997).

## Reproduction

Fire tree propagates by seeds, which are produced in small fruits (Benton, 1997). It is a prolific seed producer with the seeds also remaining *viable* in the soil for a long period of time. *M. faya* is considered to be a dioecious species, however 'male' plants often produce some fruits and 'female' individuals a few male inflorescences (PIER, 2002). It appears to be a wind-pollinated species although in Hawai'i it is visited by the introduced *Apis mellifera*, and feral pigs also play a role in dispersal, (Binggeli, 1997). An average adult female tree will produce more than 400,000 fruits per year

## General Impacts

*Morella faya* is capable of rapidly forming dense stands and has a negative effect on the recruitment and persistence of native plant species (Walker and Vitousek 1991). *M. faya* an actinorrhizal nitrogen-fixer alters primary successional ecosystems in Hawai'i Volcanoes National Park [Hawai'i, USA] by quadrupling inputs of nitrogen, the nutrient limiting to plant growth (Vitousek, 1990).

## Management Info

**Preventative measures:** A [Risk Assessment of \*Morella faya\*](#) for Hawai'i and other Pacific islands was prepared by Dr. Curtis Daehler (UH Botany) with funding from the Kaulunani Urban Forestry Program and US Forest Service. The alien plant screening system is derived from Pheloung *et al.* (1999) with minor modifications for use in Pacific islands (Daehler *et al.* 2004). The result is a score of 8 and a recommendation of: "Likely to cause significant ecological or economic harm in Hawai'i and on other Pacific Islands as determined by a high WRA score, which is based on published sources describing species biology and behaviour in Hawai'i and/or other parts of the world."

**Physical:** Introduced frugivorous birds and feral pigs are important dispersal agents of fire tree seeds, management options should include control of these dispersal agents to limit further spread. Goats can also be used to control the fire tree.

**Chemical:** Herbicide is the primary tool used for fire tree. Roundup (Glyosphate based herbicide) was found to be the most efficient herbicidal treatment because of its effectiveness in undiluted form and through its rapid absorption rate (30-40 minutes). Research results concluded that injection of undiluted Roundup provided the least exposure to nearby non-target species. Environmental soundness is related to the chemical's rapid inactivation in the soil by micro-organisms. In its undiluted form, Roundup can be used in small quantities (5-10 ml per tree). Tordon 22K was also effective in small quantities of undiluted form, however, absorption rate was intermediate (24-48 hours). Kuron absorption rate was slow (more than 1 week). Treatment of undiluted Roundup or Tordon 22K allowed for the reduction in treatment quantity. The smaller quantities of treatments necessary due to the elimination of a solution reduced the amount of total treatment needed out in the field, therefore reducing labour and transportation costs. The absorption rate of Roundup allowed for the rapid re-use of tube sections, which affected the amount of equipment needed in the field. Also, the absorption rate (30-40 minutes) allowed the field workers to leave the site shortly after application allowing for quicker site-to-site application. Injection of undiluted Roundup provided the least exposure to nearby non-target species.

**Biological:** A moth *Caloptilia* sp. nr. *schinella* a native of the Azores and Madeira Islands in the eastern Atlantic where its natural host is *M. faya* was released in Hawai'i in 1991 as a potential biological control agent (Markin, 2002).

*Phyllonorycter myricae* (Lepidoptera: Gracillariidae) is also under investigation as a possible biological control agent at the Institute of Pacific Islands Forestry laboratory, Volcano, Hawai'i.

*Botrytis cinerea* is the first pathogen to be reported on the fire tree and is reported to cause widespread fruit rot. Fruit rot has been observed on trees of all sizes in a variety of habitats throughout the Hawai'ian range. The authors of this study suggest that the selection of more aggressive strains or the introduction of large numbers of *Botrytis*-infested insect vectors early in the fruiting season may assist in enhancing biocontrol of the fire tree (Duffy and Gardner, 1994). The infected fruit were also found to be less attractive to birds, therefore lessening the spread of firetree (Seibold, 2000). *Septoria hodgesii* sp. nov a common fungal leaf pathogen of *Myrica cerifera* in the southeastern U. S has been identified as a potential biocontrol agent as it has been shown (by artificial inoculation) to be pathogenic on *M. faya* (Gardner, 1999).

## Pathway

Probably introduced for ornamental purposes in the early 18th century by colonists from Europe and Asia (Seibold, 2000). Probably introduced for medicinal purposes in the early 18th century by colonists from Europe and Asia (Seibold, 2000).

**Principal source:** [Pacific Island Ecosystem at Risk \(PIER\) \*Morella faya\*](#)

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

**Review:** Dr. Lloyd Loope, Station Leader HFS: Haleakala Field Station Maui Hawaii

**Publication date:** 2006-03-23

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## ALIEN RANGE

Global Invasive Species Database (GISD) 2024. Species profile *Morella faya*. Available from: <https://iucngisd.org/gisd/species.php?sc=100> [Accessed 24 July 2024]

[1] AUSTRALIA  
[1] UNITED STATES

[1] NEW ZEALAND

**Red List assessed species 1: CR = 1;**

[Schiedea kaalae](#) CR

## BIBLIOGRAPHY

44 references found for *Morella faya*

### Management information

[Asner, G.P., and P.M. Vitousek. 2005. Remote analysis of biological invasion and biogeochemical change. Proceedings of the National Academy of Sciences \(USA\) 102\(12\):4383-4386.](#)

**Summary:** A study using airborne imaging spectroscopy and photon transport modeling to determine how biological invasion (specifically the nitrogen-fixing tree *Myrica faya* and the invasive understory herb *Hedychium gardnerianum*) altered the chemistry of forest canopies across a Hawaiian montane rain forest landscape.

Available from: <http://www.pnas.org/cgi/content/abstract/0500823102v1> [Accessed 25th April 2005]

Asner, Gregory P.; Martin, Roberta E.; Knapp, David E.; Kennedy-Bowdoin, Ty, 2010. Effects of *Morella faya* tree invasion on above ground carbon storage in Hawaii. *Biological Invasions*. 12(3). MAR 2010. 477-494.

[Benton, Nancy. 1997. Fire Tree, \*Morella faya\* \(Ait.\) Wilbur. Plant Conservation Alliance, Alien Plant Working Group.](#)

**Summary:** Information on native Range, threats of the plant, background, habitat, reproduction and some management information.

Available from: Found at: <http://www.nps.gov/plants/alien/fact/myfa1.htm> [25 February 2003]

Boelman, Natalie T.; Asner, Gregory P.; Hart, Patrick J.; Martin, Roberta E., 2007. Multi-trophic invasion resistance in Hawaii: Bioacoustics, field surveys, and airborne remote sensing. *Ecological Applications*. 17(8). DEC 2007. 2137-2144.

Daehler, C.C; Denslow, J.S; Ansari, S and Huang-Chi, K., 2004. A Risk-Assessment System for Screening Out Invasive Pest Plants from Hawaii and Other Pacific Islands. *Conservation Biology* Volume 18 Issue 2 Page 360.

**Summary:** A study on the use of a screening system to assess proposed plant introductions to Hawaii or other Pacific Islands and to identify high-risk species used in horticulture and forestry which would greatly reduce future pest-plant problems and allow entry of most nonpests. Duffy, Brion K. and Gardner, Donald E. 1994. Locally established fruit rot of *Myrica faya*, a noxious weed in Hawaii. *Plant Disease*. 78(9). 1994. 919-923

**Summary:** Report into the possibility of using *Botrytis cinerea* as a biocontrol for *M. faya*.

Duffy, Brion K. and Gardner, Donald E. 1999. Nematodes associated with the invasive weed *Myrica faya* in Hawaii. *Nematropica*. 29(1). June, 1999. 95-97

**Summary:** Nematodes were found to be associated with the roots of the invasive tree.

Gardner, Donald E. 1999. *Septoria hodgesii* sp. nov: A potential biocontrol agent for *Myrica faya* in Hawaii. *Mycotaxon*. 70(0). Jan-March, 1999. 247-253

**Summary:** A fungus maybe a possible biocontrol for *Myrica faya*

Gonzalez-Perez, Miguel A.; Newton, Craig; Sosa, Pedro A.; Rivero, Elizabeth; Gonzalez-Gonzalez, Edna A., 2009. Characterization of six microsatellite loci in *Myrica faya* (Myricaceae) and cross amplification in the endangered endemic *M. rivis-martinezii* in Canary Islands, Spain. *Genetics & Molecular Biology*. 32(1). 2009. 117-120.

Loh, Rhonda K.; Daehler, Curtis C., 2007. Influence of invasive tree kill rates on native and invasive plant establishment in a Hawaiian forest. *Restoration Ecology*. 15(2). JUN 2007. 199-211.

Loh, Rhonda K.; Daehler, Curtis C., 2008. Influence of woody invader control methods and seed availability on native and invasive species establishment in a Hawaiian forest. *Biological Invasions*. 10(6). AUG 2008. 805-819.

Markin, George P. 2002. *Proceedings of the Hawaiian Entomological Society*. 35 January, 2002. 67-76

**Summary:** Report on the effectiveness of using the moth *Caloptilia* sp. Nr. *schinella* in controlling this invasive plant.

Markin, G.P.; Silva, L. and Aguiar, A.M.F. 1995. The insect fauna associated with the tree *Myrica faya* (Myricaceae) in the Macaronesia Islands and on Mainland Portugal. *Boletim do Museu Municipal do Funchal*. 0(SUPPL. 4). 1995. 411-420

**Summary:** Report into the search for a suitable biocontrol agent for use in Hawaii.

[Motooka, P. 2000. Summaries of herbicide trials for pasture, range, and non-cropland weed control-1999. College of Tropical Agriculture and Human Resources of the University of Hawaii at Manoa.](#)

**Summary:** Data published to assist applicators experimenting with herbicides for weed control.

[National Pest Plant Accord, 2001. Biosecurity New Zealand.](#)

**Summary:** The National Pest Plant Accord is a cooperative agreement between regional councils and government departments with biosecurity responsibilities. Under the accord, regional councils will undertake surveillance to prevent the commercial sale and/or distribution of an agreed list of pest plants.

Available from: <http://www.biosecurity.govt.nz/pests-diseases/plants/accord.htm> [Accessed 11 August 2005]

New Zealand Plant Conservation Network, 2005. Unwanted Organisms. Factsheet *Myrica faya*

[PIER \(Pacific Island Ecosystems at Risk\), 2002. \*Morella faya\*](#)

**Summary:** Ecology, synonyms, common names, distributions (Pacific as well as global), management and impact information.

Available from: [http://www.hear.org/pier/species/morella\\_faya.htm](http://www.hear.org/pier/species/morella_faya.htm) [Accessed 5 February 2003].

[Royal New Zealand Institute of Horticulture \(RNZIH\), 2005. Fire tree \*Myrica faya\*](#)

**Summary:** Available from: [http://www.rnzih.org.nz/pages/nppa\\_040.pdf](http://www.rnzih.org.nz/pages/nppa_040.pdf) [Accessed 1 October 2005]

Seibold, Ryan. Controlling Fire Tree (*Myrica faya*) in Hawaii. Volume 6 - Fall 2000: Invasive Species & Ecosystem Restoration. Student On-Line Journal (Hort 5015/5071). University of Minnesota, St. Paul, Minnesota (USA). Department of Horticultural Science.

**Summary:** Detailed management information. Information on Geography, Ecosystems effected and biology of the Fire tree.

Silva, Luis; Markin, George and Tavares, Joao. 1995. *Argyresthia atlanticella* Rebel (Insecta: Lepidoptera) an excluded agent for *Myrica faya* Aiton (Myricaceae) biocontrol. Arquipelago Boletim Da Universidade Dos Acores Ciencias Biologicas e Marinhas. 0(13A). 1995. 105-113

**Summary:** A possible biocontrol agent has been excluded as a biocontrol agent due to non specificity

[Stanford Report, March 9, 2005. Scientists use aerial imaging to find hidden invaders in Hawaiian rain forest](#)

**Summary:** Available from: <http://news-service.stanford.edu/news/2005/march9/invade-030905.html> [Accessed 25th April 2005]

## General information

Adler, Peter B.; D Antonio, Carla M. and Tunison J. Timothy. 1998. Understorey succession following a dieback of *Myrica faya* in Hawaii Volcanoes National Park. Pacific Science. 52(1). Jan., 1998. 69-78

Aplet, G.H. 1990. Alteration of earthworm community biomass by the alien *Myrica faya* in Hawaii USA. Oecologia. 82(3). 1990. 414-416

[Binggeli, Pierre. 1997. \*Myrica faya\* L. \(Myricaceae\).](#)

**Summary:** Information on Characteristics, Status (native and introduced regions), and ecological information also.

Available from: <http://members.lycos.co.uk/WoodyPlantEcology/docs/web-sp12.htm> [Accessed 25 February 2003]

Csurhes, S. & Edwards, R., 1998. Potential Environmental Weeds in Australia. Queensland Department of Natural Resources.

**Summary:** Description of plant plus detailed information into the possible invasive patterns of *M. faya*.

D Antonio, Carla M. and Mack, Michelle. 2001 Exotic grasses potentially slow invasion of an N-fixing tree into a Hawaiian woodland.

Biological Invasions 3 (1) 2001. 69-73

**Summary:** Report into the possibility that another non native plant has a negative impact on the newly arrived *Myrica faya*.

[Hawaiian Alien Plant Studies \(HAPS\), 1998. University of Hawaii, Botany Department.](#)

**Summary:** Distribution and some general information.

Available from: [http://www.botany.hawaii.edu/faculty/cw\\_smith/myr\\_fay.htm](http://www.botany.hawaii.edu/faculty/cw_smith/myr_fay.htm) [Accessed 25 February 2003]

[ITIS \(Integrated Taxonomic Information System\), 2005. Online Database \*Morella faya\*](#)

**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:

[http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p\\_action=containing&taxa=Morella+faya&p\\_format=&p\\_ifx=plgl&p\\_lang=](http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Morella+faya&p_format=&p_ifx=plgl&p_lang=) [Accessed March 2005]

Larosa, A.M.; Smith, C.W. and Gardner, D.E. 1985. Role of alien and native birds in the dissemination of firetree *Myrica faya* Ait. Myricaceae and associated plants in Hawaii USA. Pacific Science. 39(4). 1985. 372-378

**Summary:** Report into the most common foragers on the *Myrica faya* tree.

Lenz, Linda and Taylor, Jeffery A. 2001. The influence of an invasive tree species (*Myrica faya*) on the abundance of an alien insect

(*Sophonia rufofascia*) in Hawaii I Volcanoes National Park. Biological Conservation. 102(3). December, 2001. 301-307

**Summary:** *Myrica faya* was found to promote the localised increase in an invasive invertebrate s abundance.

[Meyer, J.-Y. 2000. Invasive plants in the Pacific Islands. In: The Invasive Species in the Pacific: A Technical Review and Draft Regional Strategy. Sherley, G. \(tech. ed\). Published in June 2000 by the South Pacific Regional Environment Programme \(SPREP\).](#)

**Summary:** Resource that includes the distribution of invasive species throughout the Pacific Islands.

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**Summary:** Report into the behaviour of *M. faya* as a coloniser.

Smathers, G.A. and Gardner, D.E. 1979. Stand analysis of an invading firetree *Myrica faya* population Hawaii USA. Pacific Science. 33(3).

1979. 239-255

**Summary:** Study into the spread of *M. faya*.

Smith, C.W.; Lutzow-Felling, C. and Gardner, D.E. 1995. *Myrica faya*: One man s meat is another man s poison. Boletim do Museu Municipal do Funchal. 0(SUPPL. 4). 1995. 699-706

**Summary:** A report into the history of infestation in Hawaii.

Turner, D.R. and Vitousek, P.M. 1987. Nodule biomass of the nitrogen fixing alien *M. faya* Ait. In Hawaii Volcanoes National Park USA. Pacific Science. 41(1-4). 1987. 186-190.

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[USDA-NRCS \(Natural Resource Conservation Service\). 2005. \*Morella faya\*. The PLANTS Database Version 3.5 \[Online Database\] National Plant Data Center, Baton Rouge, LA.](#)

**Summary:** Available from: <http://plants.usda.gov/java/nameSearch?mode=Scientific+Name&keywordquery=Morella+faya> [Accessed 12 March 2006].

Vitousek, Peter M.; Tweiten, Michael A.; Kellner, James; Hotchkiss, Sara C.; Chadwick, Oliver A.; Asner, Gregory P., 2010. Top-Down Analysis of Forest Structure and Biogeochemistry across Hawaiian Landscapes. Pacific Science. 64(3). JUL 2010. 359-366.

Vitousek, P.M. 1990. Biological invasions and ecosystem processes towards an integration of population biology and ecosystem studies.

Oikos. 57(1). 1990. 7-13

**Summary:** Report into the effect that *M. faya* has on primary successional ecosystems.

Vitousek, P.M. and Walker, L.R. 1989. Biological invasion by *M. faya* in Hawaii USA plant demography nitrogen fixation ecosystem effects.

Ecological Monographs. 59(3). 1989. 247-266

**Summary:** Investigation into the effect of *M. faya* on a young volcanic area.

Vitousek, P.M.; Walker, L.R.; Whiteaker, L.D.; Mueller-Dombois, D. and Matson, P.A. 1987. Biological invasion by *M. faya* alters ecosystem development in Hawaii USA. Science (Washington DC). 238(4828). 1987. 802-804.

**Summary:** Report into the way that *M. faya* affects the ecosystem.

Walker, L.R. 1990. Germination of an invading tree species *M. faya* in Hawaii USA. Biotropica. 22(2). 1990. 140-145

**Summary:** Investigation into the effects of seed dispersal on germination success.



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Walker, L.R. and Vitousek, P.M. 1991. An invader alters germination and growth of a native dominant tree in Hawaii USA. *Ecology*. 72(4). 1991. 1449-1455

**Summary:** Native tree species are being excluded from growing under the new invasive plants.

Wilbur, Robert L., 1994. The Myricaceae of the United States and Canada: Genera, subgenera, and series. *SIDA Contributions to Botany*. 16(1). 1994. 93-107.

Woodward, S.A.; Vitousek, P.M.; Matson, K.; Hughes, F.; Benvenuto K. and Matson, P.A. 1990. Use of the exotic tree *M. faya* by the native and exotic birds in Hawaii Volcanoes National Park Hawaii USA

**Summary:** Report into the avian visitors to *M. faya* trees. Native birds did not ingest the fruit however non native birds did.