GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Cinchona pubescens***

Cinchona pubescens 简体中文 正體中文 **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Rubiales	Rubiaceae

Common name hoja de zambo (Spanish, Ecuador), quinoa (Spanish, Ecuador), roja (Spanish, Ecuador), rosada (Spanish, Ecuador), quinine (English), chinarindenbaum (German), Roter Chinarindenbaum (German), red cinchona (English), quinquina (French), cascarilla (Spanish, Ecuador), hoja ahumada (Spanish, Ecuador), arbre à quinine (French)

Synonym
Cinchona chomeliana , (Weddell)
Cinchona cordifolia , (Mutis)
Cinchona decurrentifolia , (Pav&#65533;n in Howard)
Cinchona hirsuta , (Ruiz & Pav&#65533;
Cinchona lechleriana , (Schlechtendal)
Cinchona lutea , (Pav&#65533;n in Howard)
Cinchona microphylla , (Mutis ex Lamb)
Cinchona ovata , (Ruiz & Pav&#65533;
Cinchona pelalba , (Pav&#65533;n ex DC)
Cinchona pelletieriana , (Weddell)
Cinchona platyphylla , (Weddell)
Cinchona purpurascens , (Weddell)
Cinchona purpurea , (Ruiz & Pav&#65533;
Cinchona rosulenta , (Howard ex Weddell)
Cinchona rotundifolia , (Pav&#65533;n ex Lambert)
Cinchona rufinervis , (Weddell)
Cinchona succirubra , (Pav&#65533;n ex Klotzsch)

Similar species *Cinchona calisaya, Cinchona ledgeriana, Cinchona officinalis*

Summary Cinchona pubescens is a widely cultivated tropical forest tree which invades a variety of forest and non-forest habitats. It spreads by wind-dispersed seeds and vegetatively via multiple suckers up to several metres away from original tree once it is established. C. pubescens replaces and outshades native vegetation.

view this species on IUCN Red List

Species Description
Cinchona pubescens is a small to rather large tree up to 10m high. Its bark tends to turn reddish when cut. Leaves are shaped from broadly elliptic or oval to broadly oblong, are rather thin, conspicuously veined, somewhat pubescent beneath and turn red with age while persisting on the tree. Flowers are in large panicles, pink and fragrant (white to light pink in Galápagos); capsules ovoid fusiform, 2-3cm long, walls firm (PIER, 2002).

Lifecycle Stages
In the Galápagos, *Cinchona pubescens* flowers and fruits almost all year round with peak flowering from August to October and peak fruiting from December to March. Experiments have shown that seeds are viable in the soil for less than a year (Rentería, 2002).

Uses
The bark of *Cinchona pubescens* is used for extraction of *quinine* compounds.In Galápagos, poles from large trees are used for construction. However, it is not used to make boards (Heinke Jager, pers. Comm., 2005).

Habitat Description
In its native range in Ecuador, *Cinchona pubescens* grows in volcanic soil rich in organic matter but also in very rocky areas, where the roots are exposed to the air. It grows best in disturbed habitats, especially in areas where vegetation was burnt (Acosta-Solís 1945)

Reproduction
Cinchona pubescens spreads rapidly by wind-dispersed seeds. It grows fast (1-2m per year) and produces seed from the age of 4 years. *C. Pubescens* also produces suckers from roots, and re-sprouts readily from damaged stems. Enormous quantities of small seeds are produced. In Galápagos, saplings grow about 1 metre per year, adult trees however show less growth. Seed production has been observed in small trees of 1.8m height, 1.5cm DBH and 2 years old (H. Jäger, unpubl. Data). Experiments in Galápagos have shown that most seeds do not spread more than about 15m (rarely up to 30m) from the mother plant (Rentería 2002). Despite these findings, the actual distribution suggests a greater rate of spread, considering its original point distribution in 1946 and current distribution of 11000 ha, which represents a likely rate of expansion of 95m or more per year (assuming circular area of occupation).

Nutrition
Cinchona pubescens exhibits an association with arbuscular mycorrhizae. It grows well on acid volcanic soils.

General Impacts
Rapid spread, fast growth and growth habit (tree with dense canopy) of *C. pubescens* result in fast invasion and replacement of native vegetation in naturally treeless environments. Shrub and herb layers experience dramatic loss of species diversity, with very few species able to grow below canopy.

Management Info
Preventative measures: A Risk Assessment of \r\r\n*Cinchona pubescens* 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 9 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: Manual methods, including felling adults and pulling out (\"grubbing\") of stumps and saplings, have mixed success. This option is reasonably effective if all roots greater than 2cm in diameter are removed. Removal of saplings is effective, but adult trees can resprout from cut stumps. De-barking is ineffective, even if bark removed from up to 1m of stem: bark regrows and repairs wound, and tree survives.
Chemical: Buddenhagen *et al*. (2004) undertook a review of control methods used to manage *C. pubescens* in the Galapagos National Park over three decades; a variety of herbicides and application methods were tested. The study found that a mixture of picloram and metsulfuron (240 and 15g ai/L, respectively) killed 73 to 100% of trees when applied to connecting machete cuts around the circumference of tree trunks ('hack and squirt') at concentrations of 5, 10 and 25% in water, with large trees requiring higher concentrations. The authors indicate that although this mixture was effective when applied using other methods, 'hack and squirt' was the least labour intensive. The authors suggest that this treatment plan could be used effectively in other locations like Hawaii and Tahiti where *C. pubescens* is invasive and being controlled.
The Weed Control Methods Handbook provides you with detailed information about the tools and techniques available for controlling invasive plants, or weeds, in natural areas. This Handbook is divided into eight chapters, covering a range of different control methods: manual, mechanical, promoting competition from native plants, grazing, biocontrol, herbicides, prescribed fire, solarization, flooding, and other, more novel, techniques. Each control method has advantages and disadvantages in terms of its effects against the target weed(s), impacts to untargeted plants and animals, risks to human health and safety, and costs.

Pathway
Introduced as a medicinal plant to Galapagos by private farmers, as cash crop.

Principal source: Pacific Islands Ecosystems at Risk (PIER), 2002. *Cinchona pubescens* Vahl, Rubiaceae
Jean-Yves Meyer, Délégation à la Recherche, Papeete, Tahiti, French Polynesia

Compiler: IUCN SSC Invasive Species Specialist Group
Updates with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review:

Pubblication date: 2010-10-04

ALIEN RANGE

[3] ECUADOR
[1] UNITED STATES
[2] FRENCH POLYNESIA

Red List assessed species 1: VU = 1;

Laterallus spilonotus **VU**

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26 references found for **Cinchona pubescens**

Managment information

Buddenhagen, C., and Y�nez, P. 2005. The cost of quinine *Cinchona pubescens* control on Santa Cruz Island, Galapagos. Galapagos Research 63:32-36.
Summary: Analysis of the cost of controlling the invasive quinine tree *Cinchona pubescens* Vahl in the highlands of Santa Cruz Island, Galapagos.
Buddenhagen, C.E., Renter�a, J.L., Gardener, M., Wilkinson, S.R., Soria M., Y�nez, P., Tye, A., and Valle, R. 2004. The Control of a Highly Invasive Tree *Cinchona pubescens* in Gal�pagos. Weed Technology 18:1194-1202. Weed Science Society of America, Lawrence, Kansas, USA.
Summary: A review of past efforts to control *C. pubescens* in the Galapagos Islands and a discussion on the results of a test of a variety of herbicides and selective application methods.
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.
European and Mediterranean Plant Protection Organization (EPPO), 2006. Guidelines for the management of invasive alien plants or potentially invasive alien plants which are intended for import or have been intentionally imported. EPPO Bulletin 36 (3), 417-418.
IUCN/SSC Invasive Species Specialist Group (ISSG)., 2010. A Compilation of Information Sources for Conservation Managers.
Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
Jäger, H. 1999. Impact of the introduced tree *Cinchona pubescens* Vahl on the native flora of the highlands of Santa Cruz Island (Galapagos Islands). Diplomarbeit, Univ. Oldenburg, Germany.
Summary: Evaluates the impact on native vegetation in the Miconia and Fern-sedge Zones. Reveals drastic reduction in species diversity under canopy of quinine trees, including severe effects on many endemic plant species.
PIER (Pacific Island Ecosystems at Risk), 2002. *Cinchona pubescens*
Summary: Ecology, synonyms, common names, distributions (Pacific as well as global), management and impact information.
Available from: http://www.hear.org/pier/species/cinchona_pubescens.htm [Accessed 5 February 2003].
Renteria, J. L. 2002. Ecolog�a y manejo de la cascarilla (*Cinchona pubescens* Vahl), en Santa Cruz, Galapagos. Área Agropecuaria y de Recursos Naturales Renovables. Loja, Ecuador: Universidad Nacional de Loja. Pp. 1-89.
Summary: Gives information on the distribution, density, phenology, seed dispersal and seed longevity of *C. pubescens* in the Gal�pagos National Park and the agricultural zone. Furthermore, it gives results of chemical control experiments, using different control techniques and different herbicides.
Renter�a, Jorge Luis; Rachel Atkinson, Ana Mireya Guerrero, Johanna Mader 2006. Manual de Identification y Manejo de Malezas en las Islas Gal�pagos. Segunda edici�n, Fundaci�n Charles Darwin, Santa Cruz, Gal�pagos, Ecuador.
Summary: An illustrated guide providing practical information for the effective control of the worst invasive plant species in Galapagos. Designed for farmers and other land managers, it describes manual and chemical control methods. It also includes 8 species that are potential problems for Galapagos. Language: Spanish
Una gu�a con ilustraciones que provee informaci�n para el control efectivo de las peores plantas invasoras en Gal�pagos. Esta dise�ada para los agricultores y personas involucradas en conservaci�n. De una forma clara y simple se describe los m�todos de control manuales y qu�micos; tambi�n incluye 8 especies que potencialmente podr�an ser un problema para Gal�pagos. Lenguaje: Espa�ol.
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Summary: Available from: http://www.hear.org/starr/hiplants/reports/html/cinchona_pubescens.htm

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Andersson, L. and Taylor, C. M. 1994. Rubiaceae-Cinchoneae-Coptosapelteae. Flora of Ecuador, part 50. Dept of Systematic Botany, University of Goteborg.
Summary: Revision of the group, identification keys, full descriptions and synonymy.
Florence J., Chevillotte H., Ollier C. & Meyer J.-Y. 2007. *Cinchona pubescens* Base de donn�es botaniques Nadeaud de l Herbier de la Polyn�sie fran�aise (PAP).
Summary: Base de donn�es sur le flore de Polyn�sie Fran�aise.
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ITIS (Integrated Taxonomic Information System), 2004. Online Database *Cinchona pubescens*
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.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=501523 [Accessed December 31 2004]
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Summary: Dissertation: Vanquin. V, on a study of the ecology and invasion dynamics of the quinine tree *Cinchona pubescens* in rainforests of Tahiti.