

*Schinus terebinthifolius*   简体中文  正體中文

**System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Sapindales	Anacardiaceae

**Common name** pimienta de Brasil (English, Puerto Rico), Christmas berry (English), Mexican pepper (English), Brazilian pepper tree (English), Brazilian pepper (English), Brazilian holly (English), Rosapfeffer (German), Florida holly (English), poivrier d'Amérique (French), faux poivrier (French), poivre du Brésil (French), poivre rose (French), encient (French), warui (Fijian), poivre marron (French), naniohilo (Hawaiian), wilelaiki (Hawaiian), copal (Spanish), baie rose (French)

## Synonym

## Similar species

**Summary** Native to Argentina, Paraguay and Brazil, *Schinus terebinthifolius* is a pioneer of disturbed sites, but is also successful in undisturbed natural environments. It is an aggressive evergreen shrub or small tree, 3-7 metres in height that grows in a variety of soil types and prefers partial sun. *Schinus terebinthifolius* produces shady habitats that repel other plant species and discourage colonisation by native fauna and alter the natural fire regime. Its fruit has a 'paralysing effect' on birds and even grazing animals when ingested. *Schinus terebinthifolius* seeds are dispersed by birds and mammals and it readily escapes from garden environments. It is planted as both an ornamental and shade tree and has many uses.



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

## Species Description

*Schinus terebinthifolius* is an evergreen shrub or small tree, 3-7 metres tall or more. The odd-pinnately compound leaves are alternately arranged on branches and range from 8 to 17cm in length. Each leaf is composed of usually 4 or 6, or sometimes more, rounded and often toothed lateral leaflets, arranged in pairs along a narrowly winged leaf axis, or rachis, and a single, terminal leaflet. When crushed, the leaves produce a pungent aroma that has been variously described, from "peppery" to "turpentine-like" (Ferriter 1997; Tomlinson, 1980).

The flowers are produced in showy, branched panicles, 2-11cm long, which arise from the axils of leaves near the ends of stems. In addition to flowers, the inflorescences also bear triangular to lanceolate, leaf-like bracts with ciliate margins. Both male and female flowers occur on stalks, or pedicels, 1mm long and essentially have the same structure: 5 small, green, triangular sepals with ciliate margins; 5 small, white, glabrous, ovate petals; 10 stamens concentrically arranged in 2 series of 5, the outer series being longer; a lobed disc at the base of the stamens; and a single-chambered, or unilocular, ovary with 3 short styles. However, in male flowers, the ovary, or pistillode, is non-functional, and in female flowers, the staminodes are sterile. On female trees, flowering is followed by the production of bright red, fleshy, spherical drupes, often referred to as "berries", each 5-6mm in diameter and containing a single seed (Ferriter 1997).

## Notes

There are five varieties listed within the South American distribution: *S. terebinthifolius* var. *terebinthifolius* – from Venezuela to Argentina; *S. terebinthifolius* var. *acutifolius* – southern Brazil and Paraguay to Misiones, Argentina; *S. terebinthifolius* var. *pohlianus* (the most common variety of the species) – southern Brazil, Paraguay, and northern Argentina; *S. terebinthifolius* var. *raddianus* – south central Brazil; and *S. terebinthifolius* var. *rhoifolius* – south central Brazil (Barkley, 1944; Barkley, 1957) in Cuda et al, 2006).

## Lifecycle Stages

Flowering and fruiting phenomena in Brazilian pepper shows distinct periodicity. The main flowering period, September to October, is marked by the production of copious flowers from axillary inflorescences developing at the ends of leafy branches. A second flowering period (March-May) occurs in less than 10% of the population (Ewel et. al., 1982, in Ferriter 1997). Fruit production occurs during the winter (November to February), at which time the branches of female trees are heavily laden with red fruits while male trees remain barren. Ewel et. al. (1982) observed that ripe fruits are retained on a tree for up to 8 months (Ferriter 1997). The survivorship of naturally established seedlings is very high ranging from 66-100%. It is extremely rare to encounter such high survivorship in weedy species. The tenacity of its seedlings makes *S. terebinthifolius* an especially difficult species to compete with, as its seedlings seem to survive for a very long time in the dense shade of an older stand where they grow, although slowly, while in openings they grow very fast (Ewel et al. 1982 in Elfers, 2001).

## Uses

*Schinus terebinthifolius* has been used as a garden plant in many countries. It is planted as both an ornamental and shade tree. The bark serves as a source of tannins and the bright red berries and leaves are used in the making of Christmas Wreaths. The berries are also used as a spice called pink peppercorn. The wood of Brazilian pepper is used in construction, as stakes, posts, and railway sleepers. Virtually all parts of this tropical tree have been used for medicinal purposes throughout the tropics including its leaves, bark, fruit, seeds, resin and oleoresin or balsam. Brazilian peppertree is also considered an important nectar and pollen source by the bee industry in the United States and Hawaii (Cuda et al, 2006).

## Habitat Description

*Schinus terebinthifolius* occurs in sub-tropical areas between latitudes 15° and 30° N and S in many countries (Hosking et al, 2003). It is a pioneer species and an aggressive invader of mesic and wet lowland environments (Smith, 1985). It is commonly found in disturbed sites, such as highway right-of- ways, canals, drained wetlands, and fallow fields and farmlands but is also successful in undisturbed natural environments including pinelands, hammocks, and mangroves (Woodall, 1982; Cuda et al, 2006). *S. terebinthifolius* prefers partial sun to full sun, grows in a variety of soil types (Woodall, 1982; Laroche, 1994a), and is known to be fairly tolerant to shade, high salinity, flooding, and fire ((Ewel, 1979; Mytinger and Williamson, 1987; Doren et al, 1991) in Cuda et al, 2006).

## Reproduction

*Schinus terebinthifolius* is largely a dioecious plant which means that the flowers are either male (staminate) or female (pistillate), and the sexes occur on male and female trees. However, a small number of trees have been observed producing bisexual ("complete") flowers or having both unisexual flowers occurring on the same individual (Ferriter 1997). Flowering generally occurs in the fall, while a small fraction flower in the spring (Elfers, 2001). Although in some locations, such as certain locations in Florida, flowering can occur year-round. Numerous small, white flowers occur in dense axillary panicles near the end of branches. Flowers produce copious amounts of pollen and nectar, and are primarily insect pollinated (Ewel et al, 1982 in Cuda et al, 2006). They are pollinated by diurnal insects, including a number of dipterans (especially a syrphid fly, *Palpada vinetorum*), hymenopterans, and lepidopterans. A massive number of bright red fruits are typically produced on the plants from November to February. Although most seed dispersal occurs shortly thereafter, some trees retain their fruits until July or August. The fruits are eaten and dispersed primarily by mammals and birds although some dispersal occurs by gravity or water. For example, raccoons (*Procyon lotor* L.) and opossums (*Didelphus virginianus*) consume fruits and contribute to seed dispersal. Although catbirds (*Dumatilla carolinensis*) have been observed feeding on the fruits, robins (*Turdus migratorius* L.) are considered the most important avian seed dispersers. They consume large quantities of seed and spread them to habitats that Brazilian peppertree would never otherwise reach (Ewel et al. 1982 in Cuda et al, 2006). Like many hardwood species, Brazilian peppertree also is capable of resprouting from above-ground stems and crowns after damage from cutting, fire, or herbicide treatment. Resprouting also occurs from the roots with or without evidence of damage and often leads to the development of new daughter plants. Resprouting and suckering often is profuse and the growth rates of the sprouts are high, which contributes to the plant's habit of forming dense clumps (Cuda et al 2006).

## General Impacts

*Schinus terebinthifolius* is an aggressive, rapidly colonizing invader of natural communities and disturbed habitats that shades out and displaces native vegetation, often forming dense monocultures that reduce the biological diversity of plants and animals in the invaded areas (Cuda *et al.*, 2006; Donnelly & Walters, 2008; Ewe & Sternberg, 2003). It is known to displace native vegetation in Florida, California, Hawaii, Bermuda, the Bahamas, and Australia ((Randall 2000; Hight *et al.* 2002; Habeck *et al.* 1994) in Cuda *et al.*, 2006). It is one of the most widespread and problematic invasive plants in Florida where it has infested nearly 280,000 ha of all terrestrial ecosystems (Cuda *et al.*, 2006). Vast monospecific stands of it pose a significant threat to the mangrove swamp communities of the Florida Everglades where it threatens rare federal and/or state listed native species such as the Beach Jacquemontia (*Jacquemontia reclinata*), the Beach Star, *Remirea maritime* (Coile 1998, D.F. Austin, pers. comm. in Cuda *et al.*, 2006), and the nesting habitat of the gopher tortoise (*Gopherus polyphemus*) (EPPO Reporting Service, 2005; Doren and Jones 1997 in Cuda *et al.*, 2006). In Hawaii, *S. terebinthifolius* is negatively impacting several threatened and endangered plant species, including the Haleakala silverword (*Argyroxiphium sandwicense macrocephalum*), liliwai (*Acaena exigua*), and the mahoe tree (*Alectryon micrococcus*) (Hight *et al.* 2002 in Cuda *et al.*, 2006). In Bermuda it invades upland margins of mangrove swamps (Mark and Lonsdale 2002). In Malta it invades the Mediterranean maquis community, which consists of mixed species, including olive (*Olea europaea*), bay laurel (*Laurus nobilis*) and the garrigue. In the Bahamas, it is found on remote islands, where it may alter habitats and interfere with nesting sites (Moyroud 2000). *S. terebinthifolius* is believed to have allelopathic properties which aid its displacement of native species (Morgan & Overholt, 2005; Hargraves, 2008). Aqueous extracts from it were found to negatively affect the growth of two native plants commonly found in south Florida's natural areas, *Bromus alba* and *Rivina humilis* (Morgan and Overholt 2005, in EPPO Reporting Service 2005). Furthermore, *S. terebinthifolius* has been found to reduce the density and species diversity of native bird populations compared to uninvaded native pinelands and forest-edge habitats and the alter natural fire regimes because of its resultant increased shade (Curnutt, 1989 in Cuda *et al.*, 2006). Brazilian peppertree was shown to have species-specific impacts on microalgae at the land-sea interface, making the possibility of a cascade effect on primary productivity, biodiversity, and community structure likely (Hight *et al.*, 2003). *S. terebinthifolius* is a relative of poison ivy and usually aggregates allergic skin reactions on contact (Florida Department of Environmental Protection). The high concentration of volatile and aromatic monoterpenes has been suggested to be the probable cause of respiratory problems associated with crushed fruits. Its highly toxic resin is found in its bark, leaves, and fruits (Lloyd *et al.*, 1977). It contains active alkenyl phenols, e.g., urushiol, cardol, which can cause contact dermatitis and inflammation in sensitive individuals (Lampe and Fagerstrom 1968, Tomlinson 1980) in Cuda *et al.*, 2006). Persons sitting beneath *S. terebinthifolius* trees exhibited flu-like symptoms, and sneezing, sinus congestion, chest pains and acute headache (Morton 1969 1978, in Ferriter 1997). The AMA Handbook of Poisonous and Injurious Plants (Lampe and McCann 1985) reports that the tripterpenes found in the fruits can result in irritation of the throat, gastroenteritis, diarrhea, and vomiting in humans (Cuda *et al.*, 2006). The ingested fruits have a 'paralysing effect' on birds and grazing animals such as horses are susceptible to its effects which can even prove fatal (Campello and Marsaioli 1974, in Ferriter 1997; Morton, 1978 in Cuda *et al.*, 2006). Intoxication of migratory robins, one of the principal avian disseminators of Brazilian peppertree, is not uncommon (Blossingame, 1955 in Cuda *et al.*, 2006).

## Management Info

"A Risk Assessment of *Schinus terebinthifolius* for Hawai'i and other Pacific islands was prepared by Dr. Curtis Daehler (UH Botany). The result is a score of 19 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."

When developing a management strategy it is important to consider the following biological traits of *S. terebinthifolius*: Its seeds are generally not viable after five months following dispersal. Water availability, especially rapid changes in water level, determines to a great extent seedling success. Its lack of success in California has been attributed to the short period of sufficient soil moisture needed for germination and root establishment. Seedlings grow very slowly and can survive in dense shade, exhibiting vigorous growth if the canopy is cleared (growing at rates of .03 to .05 metres per year (Ferriter 1997). The creation of open habitat influences and increases the rate of spread of *S. terebinthifolius*. When *S. terebinthifolius* occurs in these open disturbed areas it provides a reservoir for the plant to spread to natural environments. This means that the restoration of disturbed ecosystems back to their natural state may control the spread of the weed to native ecosystems, as well as providing an opportunity to regain native environments. The plant is capable of resprouting from above-ground stems and root crowns and resprouting is also often profuse, with new growth originating from dormant and adventitious buds. The characteristics that make the Brazilian pepper plant a successful weed include (1) fast growth, (2) prolific seed production, (3) continuous shoot extension, (4) vigorous resprouting and (5) tolerance of a wide range of growing conditions (Ewel 1979, in Ferriter 1997).

**Preventative measures:** Prohibiting the sale of *Schinus terebinthifolius* in nursery trade is an important method of slowing its spread. Florida has established a state law prohibiting the sale, cultivation, and transportation of it passed by the Florida legislature in 1990 (Cuda *et al*, 2006).

Cooperation among public and private agencies as well as from neighboring states to reduce or prohibit its use as an ornamental and manage existing populations is highly beneficial (Elfers, 2001). **Chemical:** The use of herbicides is the most commonly used and cost-effective method for controlling *S. terebinthifolius*. *S. terebinthifolius* is sensitive to foliar applications of imazapyr, to foliar and cut surface applications of triclopyr, dicamba and glyphosate, to basal bark applications of triclopyr, and to soil application of tebuthiuron and hexazinone. It is not sensitive to 2,4-D (Matooka *et al*, 2003 in PIER, 2010). Cut-stump treatment and basal bark treatment of triclopyr will effectively control it (Langland & Stocker, 2001 in Cuda *et al*, 2006). Foliar application of imazapyr and triclopyr is also effective and was found to achieve greater than 90% control.

However, foliar application will effect non-target vegetation. Imazapyr has also been used in an application referred to as lacing which involves treating only half the foliage with a low volume backpack sprayer that has reportedly yielded 98% control (Phil Waller, BASF, pers. Comm. in Cuda *et al*, 2006). Basal soil applications of both hexazinone and tebuthiuron were also effective and resulted in 80-90% control (Laroche and Baker, 1994 in Cuda *et al*, 2006). Other treatments including basal bark application of a mixture of imazapyr and triclopyr are effective in an oil-based solution (BASF, 2005 in Cuda *et al*, 2001). Excellent control was reported with triclopyr ester/oil applied basal bark at 10% of product, triclopyr amine at 50% of product in water applied to cut surfaces, and imazapyr at 1% of product in water applied as foliar sprays (Matooka *et al*, 2003 in PIER, 2010).

Karmex is recommended when the only objective is to kill *S. terebinthifolius* seedlings. It is, compared to Hyvar or Velpar, less easily leached, making shallow rooted plants, like seedlings, more susceptible than deeper rooted ones. However, on many south Florida sites, feeder roots of established desirable plants may also be very close to the surface and may be affected. Hyvar and Velpar are as effective on seedlings as Karmex, but are recommended only where larger trees are involved. Where soil characteristics or root distributions preclude soil herbicides, Tordon is recommended as a foliar spray (Woodall 1982 in Elfers, 2001).

**Biological:** A variety of biological control agents have been investigated or released to control *S. terebinthifolius*. The most important include the Brazilian pepper thrip (*Pseudophlothrips ichini*), the Brazilian pepper leafroller (*Episimus utilis*), the Brazilian pepper sawfly (*Heteroperreyia hubrichi*), Torymid wasp *Megastigmus transvaalensis*, and a variety of fungal pathogens (Cleary, 2003; Wheeler *et al*, 2001 in Cuda *et al*, 2006). A few biological control agents from southern South America that were been screened and released in Hawaii in the 1950s and 1960s include *E. utilis*, *Lithraeus atronotatus*, and *Crasimorpha infusate*. Of them two established but had little effect on Brazilian peppertree (Julian and Griffiths, 1998 in Cuda *et al*, 2006).

*E. utilis* whose larval stages defoliate *S. terebinthifolius*, was released in Hawaii in the 1950s but did not yield effective control due to unsuitable biotic and abiotic conditions. It is being evaluated for use in other locations and results imply that it may be more successful (Manrique *et al*, 2008a; Manrique *et al*, 2008b; Manrique *et al*, 2009a).

The torymid wasp *M. transvaalensis* attacks the drupes or seeds of *S. terebinthifolius* and damages them so they do not germinate. A study in Florida found that it damaged up to 31% of drupes in the major winter fruiting period and 76% in the minor spring fruiting phase. *M. transvaalensis* represents a potential biological control (Wheeler *et al*, 2001 in Cuda *et al*, 2006).

Fungi *Sphaeropsis tumefaciens*, *Rhizoctonia solani* and *Chondrostereum purpureum* are all known to infect *S. terebinthifolius* in different capacities and may also prove to be useful biological controls (Cuda *et al*, 2006).

**Physical:** The physical techniques for controlling *S. terebinthifolius* include soil removal, prescribed burning, and flooding. Soil removal can be effective for eliminating Brazilian peppertree and preventing its reestablishment but this method is labor intensive and costly. Prescribed burns have been used to control Brazilian peppertree with mixed results. The seeds fail to germinate following exposure to fire but plants readily resprout from crown and roots (Randall, 200 in Cuda *et al*, 2006). Repeated fires at 3 to 7 year intervals were found to slow its invasion but did not completely prevent re-establishment (Doren *et al*, 1991 in Cuda *et al*, 2006).

Hydro-leveling, a new technique, was tested in a mangrove forest restoration project in 2004. Hydro-leveling uses a high pressure stream of water to wash sediment from the spoil mound into the adjacent wetland and ditch. This was found to reduce but not eliminate adult *S. terebinthifolius* but did successfully eliminate seedlings. Native plants should be planted following hydro leveling to promote native recolonization (Smith *et al*, 2007).

**Mechanical control:** Once the Brazilian peppertree reaches heights of several feet, heavy equipment including bulldozers, front end loaders, and root rakes are necessary for the removal of it and its root system to prevent re-sprouting (Cuda *et al*, 2006; Elfers *et al*, 2001).

**Integrated management:** An integrated, site specific management plan should be developed for the management of *S. terebinthifolius* following guidelines provided by (Cuda, 2006).

Cut-stump treatment with 50% Garlon 3A, 10% Garlon 4 or a basal bark application of 10% Garlon 4. Foliar application of Garlon 4, Garlon 3A, Roundup Pro, Roundup Super Concentrate, or Rodeo, according label directions may be used where appropriate. Glyphosate products are less effective when used alone in spring and early summer. Use Rodeo or cut stump application of 50% Arsenal where plants are growing in aquatic sites (Langland & Stocker, undated).

Additionally, *Schinus terebinthifolius* infestations may be detected with hyperspectral instrumentation or high resolution imagery by aerial observation to evaluate its infestation in inaccessible locations and aid in management program development (Lass & Prather, 2004; Pearlstine *et al*, 2005).

**Principal source:** [Cuda, J. P., A. P. Ferriter, V. Manrique, and J.C. Medal, \(Editors\) 2006](#). J.P. Cuda, Brazilian Peppertree Task Force Chair. Interagency Brazilian Peppertree (*Schinus terebinthifolius*) Management Plan for Florida 2nd Edition. Recommendations from the Brazilian Peppertree Task Force Florida Exotic Pest Plant Council April 2006

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

**Review:** Under Revision

**Publication date:** 2011-02-23

## ALIEN RANGE

- |  |                    |
|--|--------------------|
| [1] AMERICAN SAMOA                       | [4] AUSTRALIA      |
| [1] BAHAMAS                              | [2] BERMUDA        |
| [1] CUBA                                 | [1] FIJI           |
| [2] FRENCH POLYNESIA                     | [1] GUAM           |
| [1] ISRAEL                               | [1] MALTA          |
| [1] MARSHALL ISLANDS                     | [1] MAURITIUS      |
| [1] MAYOTTE                              | [2] NEW CALEDONIA  |
| [1] NEW ZEALAND                          | [1] NORFOLK ISLAND |
| [1] PUERTO RICO                          | [1] REUNION        |
| [2] SAINT HELENA                         | [1] SAMOA          |
| [1] TURKS AND CAICOS ISLANDS             | [8] UNITED STATES  |
| [2] UNITED STATES MINOR OUTLYING ISLANDS | [1] VANUATU        |

**Red List assessed species 8: CR = 6; EN = 2;**

[Alectryon macrococcus](#) **CR**

[Chamaesyce herbstii](#) **CR**

[Commidendrum robustum](#) **EN**

[Phyllostegia mollis](#) **CR**

[Chamaesyce deppeana](#) **CR**

[Coffea myrtifolia](#) **EN**

[Labordia cyrtandrae](#) **CR**

[Schiedea kaalae](#) **CR**

## BIBLIOGRAPHY

**87** references found for *Schinus terebinthifolius*

### Managment information

Batianoff, George N.; Butler, Don W., 2002. Assessment of invasive naturalized plants in south-east Queensland. Plant Protection Quarterly. 17(1). 2002. 27-34.

Batianoff, George N.; Butler, Don W., 2003. Impact assessment and analysis of sixty-six priority invasive weeds in south-east Queensland. Plant Protection Quarterly. 18(1). 2003. 11-17.

Cleary, Ruark L., 2007. Controlling upland invasive exotic plants on public conservation land: a strategic plan. Natural Areas Journal. 27(3). JUL 2007. 218-225.

[Cuda, J. P., A. P. Ferriter, V. Manrique, and J.C. Medal, \(Editors\) 2006. J.P. Cuda, Brazilian Peppertree Task Force Chair. Interagency Brazilian Peppertree \(\*Schinus terebinthifolius\*\) Management Plan for Florida 2nd Edition. Recommendations from the Brazilian Peppertree Task Force Florida Exotic Pest Plant Council April 2006](#)

Cuda, J. P.; Gillmore, J. L.; Medal, J. C.; Pedrosa-Macedo, J. H., 2008. Mass rearing of *Pseudophilothrips ichini* (Thysanoptera : Phlaeothripidae), an approved biological control agent for Brazilian peppertree, *Schinus terebinthifolius* (Sapindales : Anacardiaceae). Florida Entomologist. 91(2). JUN 2008. 338-340.

Cuda, J. P.; Medal, J. C.; Gillmore, J. L.; Habeck, D. H.; Pedrosa-Macedo, J. H., 2009. Fundamental Host Range of *Pseudophilothrips ichini* s.l. (Thysanoptera: Phlaeothripidae): A Candidate Biological Control Agent of *Schinus terebinthifolius* (Sapindales: Anacardiaceae) in the United States. Environmental Entomology. 38(6). DEC 2009. 1642-1652.

Cuda, J. P.; Medal, J. C.; Vitorino, M. D.; Habeck, D. H., 2005. Supplementary host specificity testing of the sawfly *Heteroperryia hubrichi*, a candidate for classical biological control of Brazilian peppertree, *Schinus terebinthifolius*, in the USA. BioControl (Dordrecht). 50(1). February 2005. 195-201.

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. Donnelly, Melinda J.; Walters, Linda J., 2008. Water and boating activity as dispersal vectors for *Schinus terebinthifolius* (Brazilian pepper) seeds in freshwater and estuarine habitats. Estuaries & Coasts. 31(5). NOV 2008. 960-968.

[Elfers, S.C. 2001. Herbicide information partly updated: Tunyalee Martin, 8/2001 Element Stewardship Abstract for \*Schinus terebinthifolius\* Brazilian Pepper-tree](#)



[European and Mediterranean Plant Protection Organization \(EPPO\), 2005. Reporting Service 2005, No. 9.](#)

**Summary:** The [EPPO Reporting Service](#) is a monthly information report on events of phytosanitary concern. It focuses on new geographical records, new host plants, new pests (including invasive alien plants), pests to be added to the EPPO Alert List, detection and identification methods etc. The EPPO Reporting Service is published in English and French.

Available from: <http://archives.eppo.org/EPPOReporting/2005/Rse-0509.pdf> [Accessed 28 November 2005]

Ewe, Sharon M. L.; Sternberg, Leonel da Silveira Lobo, 2007. Water uptake patterns of an invasive exotic plant in coastal saline habitats. *Journal of Coastal Research*. 23(1). JAN 2007. 255-264.

Ferriter, A. (Ed.) 1997 Brazilian Pepper Management for Florida, *Recommendations from the Brazilian Pepper Task Force Florida Exotic Pest Plant Council* The Florida Exotic Pest Plant Council's Brazilian Pepper Task Force: Florida.

Hight, Stephen D.; Horiuchi, Ivan; Vitorino, Marcelo D.; Wikler, Charles; Pedrosa-Macedo, Jose H., 2003. Biology, host specificity tests, and risk assessment of the sawfly *Heteroperreya hubrichi*, a potential biological control agent of *Schinus terebinthifolius* in Hawaii. *BioControl* (Dordrecht). 48(4). August 2003. 461-476.

Kueffer, C. and Mauremootoo, J., 2004. Case Studies on the Status of Invasive Woody Plant Species in the Western Indian Ocean. 3. Mauritius (Islands of Mauritius and Rodrigues). Forest Health & Biosecurity Working Papers FBS/4-3E. Forestry Department, Food and Agriculture Organization of the United Nations, Rome, Italy.

[Langeland & Stocker, 2001. Control of Non-native Plants in Natural Areas of Florida](#)

Lass, Lawrence W.; Prather, Timothy S., 2004. Detecting the locations of Brazilian pepper trees in the everglades with a hyperspectral sensor. *Weed Technology*. 18(2). April 2004. 437-442.

Leonard Pearlstine, Kenneth M. Portier, and Scot E. Smith, 2005. Textural Discrimination of an Invasive Plant, *Schinus terebinthifolius*, from Low Altitude Aerial Digital Imagery. *Photogrammetric Engineering & Remote Sensing* Vol. 71, No. 3, March 2005, pp. 289-298.

[Mack, R. N and W. M. Lonsdale., 2002. Eradicating invasive plants: Hard-won lessons for islands. In \*Turning the tide: the eradication of invasive species\*: 311-318. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

**Summary:** Uses *Clidemia hirta* in Hawaii as an eradication case study. *Clidemia* is in the Melastomataceae and somewhat similar ecologically to *miconia*.

Eradication case study in *Turning the tide: the eradication of invasive species*.

Manrique, Veronica; Cuda, James P.; Overholt, William A., 2009c. Effect of herbivory on growth and biomass allocation of Brazilian peppertree (Sapindales: Anacardiaceae) seedlings in the laboratory. *Biocontrol Science & Technology*. 19(5-6). 2009. 657-667.

Manrique, Veronica; Cuda, James P.; Overholt, William A.; Diaz, Rodrigo, 2008a. Temperature-dependent development and potential distribution of *Episimus utilis* (Lepidoptera : Tortricidae), a candidate biological control agent of Brazilian peppertree (Sapindales : Anacardiaceae) in Florida. *Environmental Entomology*. 37(4). AUG 2008. 862-870.

Manrique, Veronica; Cuda, James P.; Overholt, William A.; Diaz, Rodrigo, 2008c. Temperature-dependent development and potential distribution of *Episimus utilis* (Lepidoptera : Tortricidae), a candidate biological control agent of Brazilian peppertree (Sapindales : Anacardiaceae) in Florida. *Environmental Entomology*. 37(4). AUG 2008. 862-870.

Manrique, Veronica; Cuda, J. P.; Overholt, W. A.; Ewe, S. M. L., 2009a. Synergistic effect of insect herbivory and plant parasitism on the performance of the invasive tree *Schinus terebinthifolius* *Entomologia Experimentalis et Applicata*. 132(2). AUG 2009. 118-125.

Manrique, Veronica; Cuda, J. P.; Overholt, W. A.; Ewe, S. M. L., 2009b. Influence of host-plant quality on the performance of *Episimus unguiculus*, a candidate biological control agent of Brazilian peppertree in Florida. *BioControl* (Dordrecht). 54(3). JUN 2009. 475-484.

Manrique, Veronica; Cuda, J. P.; Overholt, W. A.; Williams, D. A.; Wheeler, G. S., 2008b. Effect of host-plant genotypes on the performance of three candidate biological control agents of *Schinus terebinthifolius* in Florida. *Biological Control*. 47(2). NOV 2008. 167-171.

Martin, C. G.; Cuda, J. P.; Awadzi, K. D.; Meda, J. C.; Habeck, D. H.; Pedrosa-Macedo, J. H., 2004b. Biology and laboratory rearing of *Episimus utilis* (Lepidoptera: Tortricidae), a candidate for classical biological control of Brazilian peppertree (Anacardiaceae) in Florida. *Environmental Entomology*. 33(5). October 2004. 1351-1361.

Martin, C. G., J. P. Cuda, K. D. Awadzi, J. C. Meda, D. H. Habeck & J. H. Pedrosa-Macedo, 2009. Biology and Laboratory Rearing of *Episimus utilis* (Lepidoptera: Tortricidae), a Candidate for Classical Biological Control of Brazilian Peppertree (Anacardiaceae) in Florida. *Biological Control Weeds*

Mc Kay, Fernando; Oleiro, Marina; Cabrera Walsh, Guillermo; Gandolfo, Daniel; Cuda, James P.; Wheeler, Gregory S., 2009. Natural enemies of Brazilian Peppertree (Sapindales: Anacardiaceae) from Argentina: Their possible use for Biological Control in the USA. *Florida Entomologist*. 92(2). JUN 2009. 292-303.

[Meisenburg, M.J. and Fox, A.M. 2002. What role do birds play in dispersal of invasive plants? \*Wildland Weeds\* 5\(3\).](#)

**Summary:** Available from: [http://www.fleppc.org/publications/Wildland%20Weeds/WW\\_Summer%202002.pdf](http://www.fleppc.org/publications/Wildland%20Weeds/WW_Summer%202002.pdf) [Accessed 9th February]

[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.

[Moyroud, R. 2000. Exotic Weeds That Threaten the Caribbean, \*Wildland Weed Wildland Weeds\* 3 \(2\).](#)

**Summary:** Available from: [http://www.se-eppc.org/pubs/ww/WW\\_Spring2000.pdf](http://www.se-eppc.org/pubs/ww/WW_Spring2000.pdf) [Accessed 9th February]

[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 *Schinus terebinthifolius*

[Pacific Islands Ecosystems at Risk \(PIER\), 2010. \*Schinus terebinthifolius\* Raddi, Anacardiaceae](#)

[Pacific Islands Ecosystems at Risk \(PIER\), 2010. Risk Assessment \*Schinus terebinthifolius\* Raddi, Anacardiaceae](#)

Panetta, F. D.; Anderson, T. M. D., 2001. Chemical control of broad-leaved pepper tree (*Schinus terebinthifolius* Raddi). *Plant Protection Quarterly*. 16(1). 2001. 26-31.

Panetta, F. D.; McKee, J., 1997. Recruitment of the invasive ornamental, *Schinus terebinthifolius*, is dependent upon frugivores. Australian Journal of Ecology. 22(4). Dec., 1997. 432-438.

Peck, James H., 2003. Arkansas flora: Additions, reinstatements, exclusions, and re-exclusions. SIDA Contributions to Botany. 20(4). 22 December, 2003. 1737-1757.

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

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

Available from: [http://www.hear.org/pier/species/schinus\\_terebinthifolius.htm](http://www.hear.org/pier/species/schinus_terebinthifolius.htm) [Accessed 5 February 2003].

[Rauzon, M. J. and D. C. Drigot., 2002. Red mangrove eradication and pickleweed control in a Hawaii wetland, waterbird responses and lessons learned. In \*Turning the tide: the eradication of invasive species\*: 381-388. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.](#)

**Summary:** Eradication case study in Turning the tide: the eradication of invasive species.

[Royal New Zealand Institute of Horticulture \(RNZIH\), 2005. Christmas berry \*Schinus terebinthifolius\*](#)

**Summary:** Available from: [http://www.rnzih.org.nz/pages/nppa\\_027.pdf](http://www.rnzih.org.nz/pages/nppa_027.pdf) [Accessed 1 October 2005]

Treadwell, Lucinda W.; Cuda, J. P., 2007. Effects of defoliation on growth and reproduction of Brazilian peppertree (*Schinus terebinthifolius*) Weed Science. 55(2). MAR-APR 2007. 137-142.

[USDI. 2005. Pelican Island National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment Plan. U.S. Department of the Interior Fish and Wildlife Service: Atlanta.](#)

**Summary:** Available from: [http://library.fws.gov/CCPs/pelicanisland\\_draft.pdf](http://library.fws.gov/CCPs/pelicanisland_draft.pdf) [Accessed 9th February]

[Varnham, K. 2006. Non-native species in UK Overseas Territories: a review. JNCC Report 372. Peterborough: United Kingdom.](#)

**Summary:** This database compiles information on alien species from British Overseas Territories.

Available from: <http://www.jncc.gov.uk/page-3660> [Accessed 10 November 2009]

Williams, D. A.; Muchugu, E.; Overholt, W. A.; Cuda, J. P., 2007. Colonization patterns of the invasive Brazilian peppertree, *Schinus terebinthifolius*, in Florida. Heredity. 98(5). MAY 2007. 284-293.

Williams, D. A.; Sternberg, L. Da S. L.; Hughes, C. R., 2002. Characterization of polymorphic microsatellite loci in the invasive Brazilian pepper, *Schinus terebinthifolius*. Molecular Ecology Notes. 2(3). September, 2002. 231-232.

## General information

Baret, S., Rouget, M., Richardson, D. M., Laverigne, C., Egoh, B., Dupont, J., & Strasberg, D. 2006. Current distribution and potential extent of the most invasive alien plant species on La Réunion (Indian Ocean, Mascarene islands). Austral Ecology, 31, 747-758.

**Summary:** L'objectif de ce papier est d'identifier les zones prioritaires en matière de gestion des invasions biologiques. La Réunion en modélisant la distribution actuelle et potentielle d'une sélection de plantes parmi les plus envahissantes.

Barthelat, F. 2005. Note sur les espèces exotiques envahissantes. Mayotte. Direction de l'Agriculture et de la Forêt. 30p

**Summary:** Tableau synthétique des plantes exotiques de Mayotte classées en fonction de leur niveau d'envahissement.

[Conservatoire Botanique National De Mascarin \(BOULLET V. coord.\) 2007. \*Schinus terebinthifolius\*. - Index de la flore vasculaire de la Réunion \(Trachéophytes\) : statuts, menaces et protections. - Version 2007.1](#)

**Summary:** Base de données sur la flore de la Réunion. De nombreuses informations très utiles.

Available from: <http://flore.cbnm.org/index2.php?page=taxon&num=dffa23e3f38973de8a5a2bce627e261b> [Accessed March 2008]

Daniel F. Austin, 1978. Exotic Plants and Their Effects in Southeastern Florida. Environmental Conservation, Volume 5, Issue 01, Mar 1978, pp 25-34

Donnelly, Melinda J.; Green, Danielle M.; Walters, Linda J., 2008. Allelopathic effects of fruits of the Brazilian pepper *Schinus terebinthifolius* on growth, leaf production and biomass of seedlings of the red mangrove *Rhizophora mangle* and the black mangrove *Avicennia germinans*. Journal of Experimental Marine Biology & Ecology. 357(2). MAR 31 2008. 149-156.

Ewe, Sharon M. L.; da Silveira Lobo Sternberg, Leonel, 2005. Growth and gas exchange responses of Brazilian pepper (*Schinus terebinthifolius*) and native South Florida species to salinity. Trees (Berlin). 19(2). March 2005. 119-128.

Ewe, Sharon M. L.; Sternberg, L. Da S. L., 2002. Seasonal water-use by the invasive exotic, *Schinus terebinthifolius*, in native and disturbed communities.. Oecologia (Berlin). 133(4). December 2002. 441-448.

Ewe, Sharon M. L.; Sternberg, Leonel da Silveira Lobo, 2003. Seasonal gas exchange characteristics of *Schinus terebinthifolius* in a native and disturbed upland community in Everglades National Park, Florida. Forest Ecology & Management. 179(1-3). 3 July, 2003. 27-36

[Florence J. Chevillotte H. Ollier C. & Meyer J.-Y. 2007. \*Schinus terebinthifolius\*. Base de données botaniques Nadeud de l'Herbier de la Polynésie française \(PAP\).](#)

**Summary:** Base de données sur le flore de Polynésie Française.

Available from: [http://www.herbier-tahiti.pf/Selection\\_Taxonomie.php?id\\_tax=9981](http://www.herbier-tahiti.pf/Selection_Taxonomie.php?id_tax=9981) [Accessed March 2008]

[Frank, J.H. and McCoy, E.D. 1995. Introduction to Insect Behavioral Ecology : the Good, the Bad, and the Beautiful: Non-Indigenous Species in Florida. Invasive Adventive Insects and Other Organisms in Florida. Florida Entomologist 78\(1\)](#)

**Summary:** Available from: <http://www.fcla.edu/FlaEnt/fe78p1.html> [Accessed 9th February]

[Gargominy, O., Bouchet, P., Pascal, M., Jaffre, T. and Tournieu, J. C. 1996. Conséquences des introductions d'espèces animales et végétales sur la biodiversité en Nouvelle-Calédonie. Rev. Ecol. \(Terre Vie\) 51: 375-401.](#)

**Summary:** Conséquences to the biodiversity of New Caledonia of the introduction of plant and animal species.

[Global Compendium of Weeds \(GCW\), 2007. \*Schinus terebinthifolius\* \(Anacardiaceae\)](#)

Hargraves, Paul E., 2008. Allelopathy at the land/sea interface: Microalgae and Brazilian pepper. Marine Environmental Research. 66(5). Dec 2008. 553-555.

Hosking, John R.; Conn, Barry J.; Lepschi, Brendan J., 2003. Plant species first recognised as naturalised for New South Wales over the period 2000-2001. Cunninghamia. 8(2). December 2003. 175-187.

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

**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/itiscat/taxastep?king=every&p\\_action=containing&taxa=Schinus+terebinthifolius&p\\_format=&p\\_ifx=plgt&p\\_lang=](http://www.cbif.gc.ca/pls/itiscat/taxastep?king=every&p_action=containing&taxa=Schinus+terebinthifolius&p_format=&p_ifx=plgt&p_lang=[Accessed March 2005])

Jackson, Jerome A.; Jackson, Bette J. S., 2007. An apparent mutualistic association between invasive exotics: Brazilian pepper (*Schinus terebinthifolius*) and black spiny-tailed iguanas (*Ctenosaura similis*) Natural Areas Journal. 27(3). JUL 2007. 254-257.

Joy B. Zedler & Suzanne Kercher, 2004. Causes and Consequences of Invasive Plants in Wetlands: Opportunities, Opportunists, and Outcomes. Critical Reviews in Plant Sciences, 23(5):431-452 (2004)

Krysko, Kenneth L.; Larson, Kurt W.; Diep, David; Abellana, Ellen; McKercher, Elizabeth R., 2009. Diet of the nonindigenous Black Spiny-Tailed Iguana, *Ctenosaura similis* (Gray 1831) (Sauria: Iguanidae), in Southern Florida. Florida Scientist. 72(1). WIN 2009. 48-58.

[Kueffer, C. & Lavergne, C. 2004. Case studies on the status of invasive woody plant species in the Western Indian Ocean. R union. FAO. 36 p](#)

**Summary:** Available from: <http://www.fao.org/forestry/webview/media?mediald=6842&langld=2> [Accessed 26 March 2008]

[Langeland, K.A. and Burks, K. C \(Eds\) 1998. Identification and Biology of Non-Native Plants in Florida s Natural Areas, University of Florida. \*Schinus terebinthifolius\*](#)

**Summary:** Information on plants that pose threats to natural resource areas in Florida.

Available from: [http://www.fleppc.org/ID\\_book/Schinus%20terebinthifolius.pdf](http://www.fleppc.org/ID_book/Schinus%20terebinthifolius.pdf) [Accessed 30 December 2004]

Lemke, D. E., 1992. *Schinus terebinthifolius* Anacardiaceae in Texas. Phytologia. 72(1). 1992. 42-44.

Li, Yuncong [Reprint author]; Norland, Michael, 2001. The role of soil fertility in invasion of Brazilian pepper (*Schinus terebinthifolius*) in Everglades National Park, Florida. Soil Science. 166(6). June, 2001. 400-405

MacDonald, I. A. W., Thebaud, C., Strahm, W. A., Strasberg, D. 1991. Effects of alien plant invasions on native vegetation remnants on La Reunion (Mascarenes Islands, Indian Ocean). Environmental Conservation 18 (1):51-61.

**Summary:** Cet article est le premier   proposer une hi rarchisation des plantes les plus envahissantes de La R union. 33 plantes ont  t  ainsi class es en utilisant une m thode d velopp e en Afrique du Sud. Les bases d'une strat gie de lutte contre les plantes exotiques envahissantes sont  galement formul es.

Mandon-Dalger, I., Clergeau, P., Tassin, J., Riviere, J., and Gatti, S. 2004. Relationships between alien plants and an alien bird species on Reunion Island. Journal of Tropical Ecology. Vol. 20: 635-642.

**Summary:** Article focusing on the interaction between alien birds and plants describing many examples and the ecological feedback that takes place between an introduced bird and plants it unknowingly introduces as food.

Mandon-Dalger, Isabelle; Clergeau, Philippe; Tassin, Jacques; Riviere, Jean-Noel; Gatti, Sylvain, 2004. Relationships between alien plants and an alien bird species on Reunion Island. Journal of Tropical Ecology. 20(Part 6). November 2004. 635-642.

Matlaga, David; Roberts, Paige M.; Briggs, Venetia, 2009. Seedling Emergence and Growth of the Invasive Plant Brazilian Pepper (*Schinus terebinthifolius*) in two South Florida Soils. Florida Scientist. 72(2). SPR 2009. 179-186.

Meyer, Jean-Yves & Loope, Lloyd & Sheppard, A. & Munzinger, J r me & Jaffr , Tanguy. (2006). Les plantes envahissantes et potentiellement envahissantes dans l'archipel n o-cal donien : premi re  valuation et recommandations de gestion.

[Morgan, E. C., Overholt, W. A., 2005. Potential allelopathic effects of Brazilian pepper \(\*Schinus terebinthifolius\* Raddi, Anacardiaceae\) aqueous extract on germination and growth of selected Florida native plants. Journal of the Torrey Botanical Society 132\(1\), 2005, 11-15.](#)

**Summary:** Abstract Available from:

<http://apt.allenpress.com/aptonline/?request=get-abstract&issn=0040-9618&volume=132&issue=01&page=0011> [Accessed 28 November 2005]

Morgan, E. C.; Overholt, W. A., 2005. Potential allelopathic effects of Brazilian pepper (*Schinus terebinthifolius* Raddi, Anacardiaceae) aqueous extract on germination and growth of selected Florida native plants. Journal of the Torrey Botanical Society. 132(1). JAN-MAR05. 11-15.

Pratt, R. B.; Black, R. A., 2006. Do invasive trees have a hydraulic advantage over native trees? Biological Invasions. 8(6). SEP 2006. 1331-1341.

Smith, Thomas J. III; Tiling, Ginger; Leasure, Pamela S., 2007. Restoring coastal wetlands that were ditched for mosquito control: A preliminary assessment of hydro-leveling as a restoration technique. Journal of Coastal Conservation. 11(1). OCT 2007. 67-74.

Spector, Tova; Putz, Francis E., 2006. Biomechanical plasticity facilitates invasion of maritime forests in the southern USA by Brazilian pepper (*Schinus terebinthifolius*) Biological Invasions. 8(2). MAR 2006. 255-260.

Stevens, Jens T.; Beckage, Brian, 2009. Fire feedbacks facilitate invasion of pine savannas by Brazilian pepper (*Schinus terebinthifolius*). New Phytologist. 184(2). 2009. 365-375.

Stratton, L. C.; Goldstein, G., 2001. Carbon uptake, growth and resource-use efficiency in one invasive and six native Hawaiian dry forest tree species. Tree Physiology. 21(18). December, 2001. 1327-1334.

Tassin, J., Riv  re, J.N., Cazanove, M., Bruzseses, E. 2006. Ranking of invasive woody plant species for management on R union Island. Weed research 46, 388-403

**Summary:** L'inventaire de 318 esp ces de plantes ligneuses introduites   la R union, permet d'en identifier 132 comme naturalis es dans les  cosyst mes naturels. 26 de ces esp ces choisies parmi les plus envahissantes ont  t  class es en fonction de leur impact biologique sur les  cosyst mes indig nes.

[USDA, ARS, 2010. Taxon: \*Schinus terebinthifolia\* Raddi. National Genetic Resources Program. Germplasm Resources Information Network - \(GRIN\) \[Online Database\].](#)

[USDA-NRCS, 2010. \*Schinus terebinthifolius\* Raddi Brazilian peppertree. The PLANTS Database \(<http://plants.usda.gov>, 29 March 2010\). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.](#)



Vos, P. 2004. [Case Studies on the Status of Invasive Woody Plant Species in the Western Indian Ocean. 2. The Comoros Archipelago \(Union of the Comoros and Mayotte\). FAO.](#)

**Summary:** Article de synthèse sur les espèces ligneuses envahissantes dans l'archipel des Comores et Mayotte et les stratégies de gestion développées localement.

Available from: <http://www.fao.org/forestry/webview/media?mediaId=6556&langId=2> [Accessed 20 March 2008]

Wendelberger, Kristie S.; Fellows, Meghan Q. N.; Maschinski, Joyce, 2008. Atlas of Florida vascular plants. Restoration Ecology. 16(4). DEC 2008. 542-552.

Wiggers, M. S.; Pratt, P. D.; Tipping, P. W.; Welbourn, C.; Cuda, J. P., 2005. Within-plant distribution and diversity of mites associated with the invasive plant *Schinus terebinthifolius* (Sapindales : Anacardiaceae) in Florida. Environmental Entomology. 34(4). AUG 2005. 953-962.

Williams, Dean A.; Overholt, William A.; Cuda, James P.; Hughes, Colin R., 2005. Chloroplast and microsatellite DNA diversities reveal the introduction history of Brazilian peppertree (*Schinus terebinthifolius*) in Florida. Molecular Ecology. 14(12). OCT 2005. 3643-3656.