

# Redwood

*Acaciella glauca*  
(syn. *Acacia curassavica*, *Acacia glauca*)



Steve Csurhes and Sheldon Navie

First published 2010

Updated 2016



© State of Queensland, 2016.

The Queensland Government supports and encourages the dissemination and exchange of its information. The copyright in this publication is licensed under a Creative Commons Attribution 3.0 Australia (CC BY) licence.



You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

Note: Some content in this publication may have different licence terms as indicated.

For more information on this licence visit <http://creativecommons.org/licenses/by/3.0/au/deed.en>

# Contents

Summary	4
Introduction	5
Identity and taxonomy	5
Description	6
Biology and ecology	8
Reproduction and dispersal	8
Origin and distribution	9
Status in Australia	9
Status in Queensland	10
Preferred habitats	10
History as a weed elsewhere	11
Uses	11
Pest potential in Queensland	12
References	14

# Summary

*Acaciella glauca* (redwood) is a shrub native to the eastern Caribbean and tropical South America. It was planted in Queensland in the 1970s and 1980s to investigate its potential as cattle forage. However, these trials concluded that it was of limited value as cattle feed and that its weed potential probably outweighed any benefits likely to be gained.

*Acaciella glauca* is thought to have spread from the experimental plots where it was planted. Most naturalised populations are currently found in the Ingham district in north Queensland, but an infestation was also recently recorded near Cannonvale in the Proserpine area. Old trial sites are currently subject to an eradication program funded by the Department of Employment, Economic Development and Innovation and the Meat and Livestock Association. A long-term commitment is required to control these infestations, detect any isolated specimens and exhaust long-lived seed banks in the soil.

This species exists in a variety of habitats in north Queensland, from the wet tropics to semi-arid environments. It has formed thickets in the Ingham district and could pose a significant threat to rangeland ecosystems in northern Australia. *Acaciella glauca* is also invasive in the Cook Islands, where it has formed dense thickets. Ecologically, it has a number of attributes that confer weed risk—a history of successful naturalisation outside its native range, high fecundity, long-lived (hard coated) seeds and relative unpalatability.

Climatically, *A. glauca* appears well adapted to Queensland's seasonally dry tropics, primarily in coastal areas where rainfall is 800–3000 mm per annum. If the populations that currently exist in Queensland are allowed to spread, this species has the potential to become a widespread and abundant pest over substantial areas of tropical rangeland, possibly also extending south into subtropical areas.

# Introduction

## Identity and taxonomy

**Species:** *Acaciella glauca* (L.) L. Rico (known as *Acacia curassavica* prior to taxonomic revision in 2006)

**Common names:** redwood, wild dividivi, amourette [French]

**Synonyms:** *Mimosa glauca* L., *Acacia glauca* (L.) Moench, *Acaciella curassavica* Britton & Killip ex Killip, *Acacia curassavica* (Britton & Killip ex Killip) Stehlé

**Family:** *Mimosaceae* (this family is sometimes alternatively known as subfamily *Mimosoideae* in the *Fabaceae* or included within the *Leguminosae*)

This species was originally described as *Mimosa glauca* in 1753, but was transferred to the genus *Acacia* by Moench in 1794 and became known as *Acacia glauca*. In 1934, Britton and Killip described what was believed to be a different species, and gave it the name *Acaciella curassavica* (Killip 1934). Stehlé (1946) transferred this plant to the genus *Acacia*, and it became widely known as *Acacia curassavica*.

However, in a recent taxonomic review by Rico Arce and Bachman (2006), the type specimens of *Mimosa glauca* and *Acaciella curassavica* were considered to be conspecific (i.e. the same species). The authors concluded that this species belonged in the genus *Acaciella*, but as the name *Mimosa glauca* had precedence, they renamed it under the new combination *Acaciella glauca*.

This change has gained acceptance in Australia (Bostock & Holland 2007; CHAH 2008; EPA 2009), but in other parts of the world the genus *Acaciella* is not recognised and the name *Acacia glauca* is now being widely used for this species (PIER 2006; GRIN 2009; USDA 2009).

*Acaciella glauca* is often confused with other closely related species such as *Acaciella villosa* (syn. *Acacia villosa*) and *Acaciella angustissima* (syn. *Acacia angustissima*), which have a similar habit, environmental adaptation and productivity.

Some taxonomists believe *A. villosa* to be the same as *A. glauca* (e.g. Bässler 1998). However, after analysis of both type specimens, Rico Arce and Bachman (2006) treated them as separate species. *Acaciella glauca* has glabrous leaflets with plane or partially involute margins. In contrast, *A. villosa* has densely pubescent leaflets with completely involute margins (Rico Arce & Bachman 2006).

When *Acaciella glauca* was first introduced into Queensland for forage trials it was wrongly identified as *Acaciella angustissima*, and for many years it was incorrectly called by the name *Acacia angustissima* in Australia. Therefore, many older references to the name *Acacia angustissima* in the Australian literature actually pertain to *Acaciella glauca* (e.g. Maslin 2001; Henderson 2002; Cook et al. 2005).

By 2004 this error was recognised, and *Acaciella glauca* plants were, for a brief period, referred to by the name *Acacia curassavica* in Australia (EPA 2004; Morton 2005; CHAH 2006; Gardiner 2006; Morton 2006). The name *Acaciella glauca* has only been applied very recently (Bostock & Holland 2007; CHAH 2008; EPA 2009), following its inception by Rico Arce and Bachman (2006).

## Description

The following description is based largely on Smith (1985), Howard (1988), Rico Arce and Bachman (2006), and Navie and Adkins (2008).

*Acaciella glauca* is a shrub or small tree growing 1.5–6 m tall (Figure 1). The stems are unarmed, smooth, sparsely pubescent or glabrate, and often reddish-brown when young (Figure 2).

The alternatively arranged leaves are bipinnate and fern-like in appearance (Figure 2). These leaves (4.5–15 cm long) are borne on glabrous or sparingly strigose petioles 2–5.5 cm long. They have 3–9 pairs of pinnae, 3–6 cm long, each with 6–30 pairs of small leaflets. These leaflets are broadly oblong or oblong–elliptic (3.5–9 mm long and 1.8–6 mm wide) with obtuse bases and rounded to slightly acute apices. They are glabrous on both surfaces or occasionally shortly strigose below. Leaflet venation is reticulate, but visible only on the paler undersides. The stipules are linear, 2–5 mm long and caducous.



Figure 1. Habit of *Acaciella glauca* (photo: Chris Gardiner)



Figure 2. Bipinnate leaves and reddish younger stems of *Acaciella glauca* (photo: Chris Gardiner)

The short, head-like racemes are borne in groups of 2–5 in the upper leaf forks (Figure 3). Each of these globular or ellipsoid racemes (1.5–2 cm long and 1.5 cm wide) is borne on a hairless peduncle 12–20 mm long. They contain numerous (15–30) densely clustered white or cream flowers that are borne on very short pedicels 0.6–1 mm long. The individual flowers have a tiny five-lobed calyx (0.6–1 mm long), 5 small petals (2–3 mm long) and numerous (100 or more) stamens with filaments 5–7 mm long.



Figure 3. Leaflets and flower clusters of *Acaciella glauca* (photo: Chris Gardiner)

The fruit is an oblong, flattened legume that is 4–8 cm long and 10–15 mm wide. These fruit are glabrous, conspicuously reticulately veined and turn from green to dark brown as they mature (figures 4 and 5). They are tapered to a stipe at the base (6–15 mm long), while their tips are obtuse with an apiculate beak 1–2.5 mm long.

Each pod contains 5–8 seeds that are transversely arranged and clearly separated from each other. These dark brown seeds are broadly ellipsoid or somewhat globular in shape (3–5 mm long and about 3 mm wide).



Figure 4. Immature fruit of *Acaciella glauca* (photo: Chris Gardiner)



Figure 5. Mature fruit of *Acaciella glauca* (photo: Chris Gardiner)

## Biology and ecology

*Acaciella* species have been cultivated on a wide range of soils, including vertisols of slightly alkaline pH (Cook et al. 2005). They also respond well to fertiliser when grown on acidic infertile soils.

In Australia, cultivated and naturalised specimens have been found growing in a variety of habitats and soil types (e.g. sandy soils, clay loams and alluvial soils). Naturalised populations have been reported from open woodlands, grasslands, creek flats and coastal floodplains, but the majority of records are from disturbed vegetation along roadsides (EPA 2009).

## Reproduction and dispersal

Flowering and fruiting is known to occur in January and February in its natural range in the northern hemisphere (Rico Arce & Bachman 2006). In northern Queensland, flowering has been recorded throughout a much greater period of the year (i.e. in April, May, June, July, August, September, October, November and December), while fruit have been recorded in May, June, July, August, September, October and November (EPA 2009; Chris Gardiner pers. comm.).

*Acaciella* species reproduce by seed and recruitment tends to occur most readily when competition from other plants is low (Cook et al. 2005). *Acaciella glauca* is known to be a prolific seed producer (Gardiner 2006). Seeds are hard-coated and, like most species of *Acacia*, can survive for many years when buried in soil. Some *Acaciella* species can also produce new shoots through root suckering and have the ability to tolerate repeated coppicing (Cook et al. 2005).

While little is known about the dispersal of *A. glauca*, much can be drawn from experience with closely-related species that have similar hard-coated seeds (e.g. *Acacia*, *Leucaena* and *Prosopis* spp.). Seeds of such species may be eaten and dispersed by cattle, or other large animals, and then germinate after passing through their digestive systems intact (Csurhes 1996; Mackey 1996; Walton 2003; Navie and Adkins 2008). Mature pods of these species may be blown short distances from the parent tree by wind (Carter 1994; Walton 2003), and fruit and seeds may be spread longer distances in floodwaters (Csurhes 1996). Short distance dispersal can also occur in mud packs formed on animals' hooves during wet periods (Carter 1994).



## Origin and distribution

This species is native to the coastal regions of northern Venezuela and a few islands in the Caribbean (i.e. Curacao, Bonaire, Barbados, St. Vincent, Montserrat and Martinique) (Figure 6).

It has been introduced to Australia, Thailand, Indonesia, China and some Pacific Islands (e.g. Fiji and the Cook Islands) (PIER 2006; Rico Arce & Bachman 2006; EPA 2009). Some sources also state that it has been introduced to the Philippines and Mauritius (ILDIS 2005; ICRAF 2009), but these sources take a wider view of *A. glauca* that encapsulates *A. villosa*. Hence, these records may actually refer to *A. villosa* and not *A. glauca*.

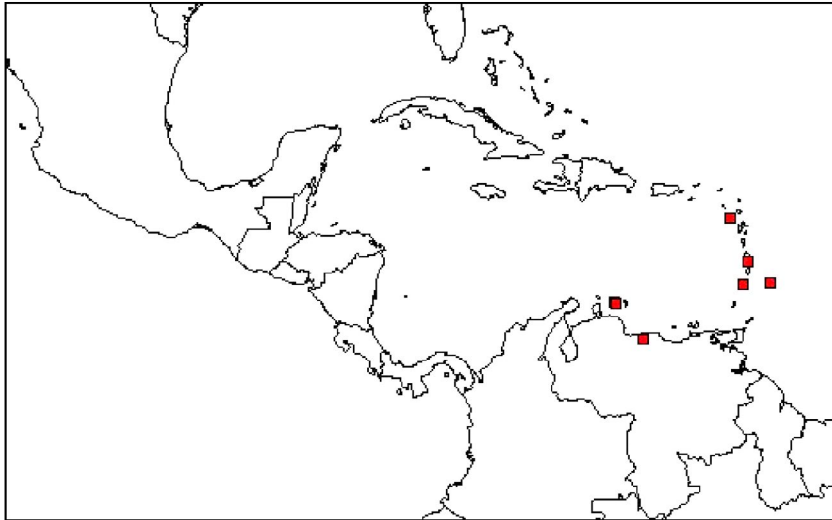


Figure 6. Native range of *Acaciella glauca* (source: Rico Arce & Bachman 2006)

## Status in Australia

*Acaciella glauca* has been recorded at several locations in eastern Queensland (Figure 7). The majority of naturalised records are from the Ingham area in the North Kennedy district. However, it has also been recorded in the Bamaga area on Cape York, at Millaroo Research Station near Ayr, at Cannonvale near Proserpine, and at Alligator Creek near Mackay.

This study was unable to find any reference to it being present in other states.

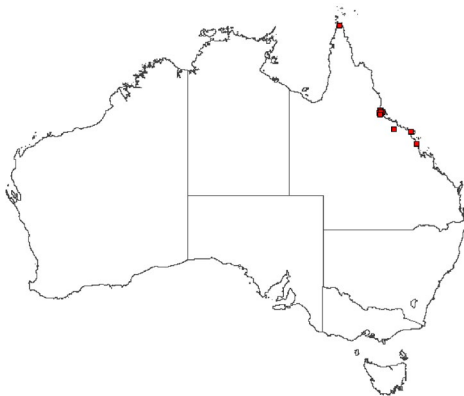


Figure 7. Naturalised distribution of *Acaciella glauca* in Australia according to herbarium records (sources: AVH 2009 and EPA 2009)

## Status in Queensland

Three accessions of *A. glauca* were introduced into Queensland from Central America for evaluation as potential shrub forage legumes between 1970 and 1972 (Gardiner 2006). The QPastures database also states that ‘a number of accessions of *A. angustissima* were planted at 27 sites in Queensland from 1975 until 1991’ to evaluate its value as a new forage plant. As *A. angustissima* was confused with *A. glauca* at this time, some of these accessions were almost certainly *A. glauca*. Herbarium records reveal that *A. glauca* was being cultivated at Walkamin Research Station, in northern Queensland, in 1979 and at Brian Pastures Research Station, near Gayndah, in 1992 (EPA 2009).

However, herbarium records also indicate that *A. glauca* was accidentally introduced into Queensland prior to these deliberate introductions (EPA 2009). In fact, there are at least three separate records of this occurring in the 1950s and 1960s. The first of these was in 1957, at Alligator Creek near Mackay, when a single plant was found growing on a farm near a small creek. The second record, in 1964, was from a pig yard in the Bamaga area on Cape York. In the same year another single plant was found growing in a centro (*Centrosema* sp.) crop at Millaroo Research Station, about 30 miles south-west of Ayr. This plant was suspected of being introduced into the country as a contaminant in centro seed (EPA 2009).

## Preferred habitats

*Acaciella glauca* prefers tropical climates but may be able to persist in warmer subtropical areas (its native range is restricted to north-eastern South America and the eastern parts of the Caribbean). Cook et al. (2005) stated that ‘annual rainfall varies from 800–3000 mm and mean temperatures range from 25–30 °C’ within its native range. However, these authors included a number of closely related species in their assessment. *Acaciella glauca* grows from sea level to 500 m in its natural range (Rico Arce & Bachman 2006).

In Queensland, naturalised specimens have been found growing in a variety of tropical environments, from the coastal wet tropics to semi-arid areas (Gardiner 2006).

## History as a weed elsewhere

*Acaciella glauca* has become invasive in the Cook Islands, where it is spreading and forming dense thickets (Space & Flynn 2002; Haysom & Murphy 2003). It is well established on the island of Mauke, and possibly also present on Mitiaro, in the southern group of the Cook Islands (McCormack 2007). Because of this it has been included in a list of plant species that pose a threat to Pacific ecosystems (PIER 2006).

This study was unable to find clear evidence that *A. glauca* was a major weed elsewhere in the world. However, various authors have noted that *Acaciella* species will spread under grazing if not regularly controlled and can escape cultivation, forming thickets along roadsides and within rangelands. Their ability to tolerate repeated coppicing—in combination with prolific seed production, rapid growth and low palatability to ruminant livestock—has enabled them to become weedy in their native ranges and in exotic locations, forming thickets along roadsides and on free-draining soils in rangelands (Cook et al. 2005).

Rico Arce and Bachman (2006), when outlining the conservation status of this species, stated that '[it] is rated as being of Least Concern (LC) due its invasive nature and large extent of occurrence'.

## Uses

*Acaciella glauca* and other closely related species (i.e. *A. angustissima* and *A. villosa*) have been under evaluation throughout the tropics as dry season forages over the past 30 years. These species have been found to be highly tolerant of repeated defoliation, but their palatability varies from 'low' to 'moderate' (Cook et al. 2005). They contain toxic compounds, such as low molecular weight phenolic compounds (i.e. polyphenolics) and non-protein amino acids, that have an anti-nutritional effect in ruminants (Smith et al. 2003; Cook et al. 2005; McSweeney et al. 2005b; McSweeney et al. 2008). Polyphenolics are widespread secondary metabolites in plants and are thought to be an important defence against herbivory (Smith et al. 2003). Research is being undertaken to isolate and characterise ruminal bacteria that degrade non-protein amino acids in the leaves of these species, in an effort to increase their usefulness (McSweeney et al. 2005a).

Despite these drawbacks, *Acaciella* species have become important forages or sources of green manure in a limited number of locations (Cook et al. 2005). For example, *A. glauca* is used as a forage species in West Timor, Indonesia (Jukema & Danimihardja 1997). They have also been proposed as a protein supplement in countries where low quality forages predominate (McSweeney et al. 2005a).

In addition to this, *Acaciella* plants have been used as fallow species in Timor, Indonesia and Zimbabwe (experimentally) to restore soil fertility in dryland cropping systems (Cook et al. 2005). In such situations they may also be employed as a source of fuel wood.

Within its native range, in the Caribbean, *A. glauca* has been used as a folk remedy. For example, an infusion of the roots or leaves in vinegar (or bark in water) is gargled to relieve a sore throat and alleviate oral inflammations (Jukema & Danimihardja 1997). Similarly, a decoction of the peeled branches with vinegar and sugar is taken as a cough medicine. However, this species has also been listed as being poisonous (Dunham et al. 1974; Wagstaff 2008).

## Pest potential in Queensland

Currently, *A. glauca* is thought to exist as naturalised populations in the North Kennedy district in northern Queensland. The most significant populations are found in the Ingham area, including a large thicket located near a vehicle rest stop on the eastern side of the Bruce Highway about 15 km south of Ingham.



Figure 8. *Acaciella glauca* infestation near Ingham in northern Queensland (photo: Chris Gardiner)

However, another infestation was found in 2006, on a property near Cannonvale in the Whitsunday Shire (Flower 2006). This infestation has been controlled by local council staff and a property management plan has been developed.

While isolated individual plants have been recorded in other parts of the state in the past (i.e. on Cape York, near Mackay and near Ayr), these are not thought to have persisted. However, *A. glauca* is known to have persisted at other sites where it was deliberately cultivated in forage trials. All known trial sites have been subject to eradication efforts by the Department of Agriculture and Fisheries, co-sponsored by the Meat and Livestock Association. However, ongoing work is required to exhaust soil seed banks.

Martin et al. (2006) included *A. glauca* (syn. *Acacia curassavica*) in their list of weeds that are known to have an impact on rangeland biodiversity. This species was also recently listed as a priority environmental weed in the Far North Queensland natural resource management region (Robertson 2006).

Cook et al. (2005) stated that extreme caution should be exercised when introducing *Acaciella* species to exotic environments, and that they will spread under grazing if not regularly controlled. Climatically, *A. glauca* is well adapted to the seasonally dry tropics of northern Australia, where rainfall ranges from 800 to 3000 mm per annum.

Martin et al. (2006) believed the following Grazing Land Management Zones to be within the potential range of this species—Arnhem Land and Tiwi Islands, Tropical Savannas, Mitchell Grass Downs, Einasleigh and Desert Uplands, North Queensland, Arid Deserts and Highly Modified Rangelands.

Based on its climatic, edaphic and habitat preferences, it is reasonable to predict that *A. glauca* has the potential to become a widespread and abundant invasive pest over much of north Queensland's wet and dry tropics. Its propensity to form a long-lived soil seed bank also means that any attempts at successful eradication will have to be prolonged.

*Acaciella glauca* has the potential to have a significant negative impact on Queensland's grazing industry as well as its environment. As this species has a propensity to form dense thickets, and trials have shown it to be relatively unpalatable to livestock (Cook et al. 2005; Gardiner 2006), it may replace much more valuable pasture species in the grasslands and savannahs in the north of the state, thereby reducing the productivity of these pastures. Its potential impact on the environment is thought to be even greater, with Grice and Martin (2006) including it on a list of 93 weeds that pose the greatest threat to rangeland biodiversity in Australia.

# References

- Bässler, M (1998). Mimosaceae. Flora de la República de Cuba. Fascículo 2. Koeltz Books, Koenigstein, Germany.
- Biosecurity Queensland (2009). Declared plants of Queensland. Fact Sheet—Invasive Plants and Animals. PP1. Invasive Plants and Animals, Biosecurity Queensland, Department of Primary Industries and Fisheries, Brisbane.
- Bostock, PD and Holland, AE (2007). Census of the Queensland Flora 2007. Queensland Herbarium, Environmental Protection Agency, Brisbane.
- Carter, JO (1994). *Acacia nilotica*: a tree legume out of control. In: Forage Tree Legumes in Tropical Agriculture (eds: R.C. Gutteridge and H.M. Shelton), CAB International, Wallingford, UK, pp. 338–351.
- CHAH (2006). Mimosaceae—Acacia. Australian Plant Census. <<http://www.anbg.gov.au/chah/apc/interim/Mimosaceae-Acacia.pdf>>. Council of Heads of Australian Herbaria (CHAH), Canberra.
- CHAH (2008). Australian Plant Census. <<http://www.anbg.gov.au/chah/apc/index.html>>. Council of Heads of Australian Herbaria (CHAH), Canberra, accessed 27 April 2009.
- Cook, BG, Pengelly, BC, Brown, SD, Donnelly, JL, Eagles, DA, Franco, MA, Hanson, J, Mullen, BF, Partridge, IJ, Peters, M and Schultze-Kraft, R (2005). Tropical Forages: an interactive selection tool, (CD-ROM), CSIRO, Department of Primary Industries and Fisheries, CIAT and ILRI, Brisbane, Australia.
- Csurhes, S (1996). Mesquite (*Prosopis* spp.) in Queensland. Pest Status Review Series—Land Protection Branch. Land Protection, Department of Natural Resources and Mines, Brisbane.
- Department of Primary Industries and Fisheries (2008). QPastures Database (Queensland Pasture and Forage Plant Evaluation Database). Department of Primary Industries and Fisheries, Brisbane, Queensland, accessed July 2008.
- Dunham, LJ, Sheets, RH, and Morton, JF (1974). 'Proliferative lesions in cheek pouch and esophagus of hamsters treated with plants from Curacao, Netherland Antilles', *Journal of the National Cancer Institute* 53: 1259–1269.
- EPA (2004). New Plant Names and Taxa Queensland: July 1994 to July 2003. Queensland Herbarium, Environmental Protection Agency (EPA), Brisbane.
- EPA (2009). HERBRECS Database. Queensland Herbarium, Environmental Protection Agency (EPA), Brisbane, accessed 11 March 2009.
- Fisher, A, Hunt, L, James, C, Landsberg, J, Phelps, D, Smyth, A, and Weston, I (2004). Review of total grazing pressure management issues and priorities for biodiversity conservation in rangelands: a resource to aid NRM planning. Desert Knowledge CRC Project Report No. 3. Desert Knowledge CRC and Tropical Savannas Management CRC, Alice Springs.
- Flower, K (2007). Update on Class 1 Pest Plants in the Central West Region. In: Pioneer Catchment & Landcare News, March 2007. Pioneer Catchment & Landcare Group Inc., Mackay.

FNQROC (2006). Draft Far North Queensland Local Government Pest Plan Advisory Committee Regional Pest Management Plan. Far North Queensland Regional Organisation of Councils Inc., Cairns.

FNQROC (2008). Far North Queensland Regional Organisation of Councils Regional Weed Spread Prevention Strategy (2008–2010). Far North Queensland Regional Organisation of Councils Inc., Cairns.

Gardiner, C (2006). Pre-emptive eradication of weedy forages. In: Weed Spotters Newsletter, Summer 2006, Number 6. CRC for Australian Weed Management (CRAWM).

Grice, T and Martin, T (2006). Weed Management: managing for biodiversity in the rangelands—Summary report. Department of the Environment and Heritage, Canberra.

GRIN (2009). Taxon: *Acacia glauca* (L.) Moench. Germplasm Resources Information Network (GRIN). <<http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?100202>>. National Germplasm Resources Laboratory, National Genetic Resources Program, Agricultural Research Service (ARS), United States Department of Agriculture (USDA), Beltsville, Maryland, accessed 27 April 2009.

Haysom, KA and Murphy, ST (2003). The status of invasiveness of forest tree species outside their natural habitat: a global review and discussion paper. Forest Health and Biosecurity Working Paper FBS/3E. Forestry Department, FAO, Rome.

Henderson, RJF (2002). Names and Distribution of Queensland Plants, Algae and Lichens. Queensland Herbarium, Environmental Protection Agency, Brisbane.

Howard, RA (1988). Flora of the Lesser Antilles: Leeward and Windward Islands. Volume 4, Dicotyledoneae—Part 1. Arnold Arboretum, Harvard University.

ICRAF (2009). *Acacia glauca*. AgroForestryTree Database. <http://www.worldagroforestry.org/sea/Products/AFDbases/af/asp/SpeciesInfo.asp?SpID=18010>. International Council for Research in Agroforestry (ICRAF), accessed 27 April 2009.

ILDIS (2005). LegumeWeb: World Database of Legumes, version 10.01 (online database). <http://www.ildis.org/>. International Legume Database and Information Service, University of Reading, UK, accessed 27 April 2009.

Jukema, J and Danimihardja, S (1997). *Acacia glauca* (L.) Moench. In: PROSEA : Plant Resources of South-East Asia 11, Auxiliary Plants (eds: I. Faridah Hanum and L.J.G Van der Maesen). Yayasan Obor Indonesia, Jakarta.

Killip, EP (1934). 'New plants mainly from western South America—IV', *Journal of the Washington Academy of Sciences* 24: 42–52.

Mackey, AP (1996). Prickly acacia (*Acacia nilotica*) in Queensland. Pest Status Review Series—Land Protection Branch. Land Protection, Department of Natural Resources and Mines, Brisbane.

Martin, TG, Campbell, S and Grounds, S (2006). 'Weeds of Australian rangelands', *The Rangeland Journal* 28: 3–26.

Maslin, BR (2001). WATTLE: Acacias of Australia. CD-ROM. Australian Biological Resources Study (ABRS) and Department of Conservation and Land Management (CALM), Government of Western Australia.

McCormack, G (2007). *Acacia glauca*. Redwood. Cook Islands Biodiversity Database. <<http://cookislands.bishopmuseum.org/species.asp?id=13943>>. Cook Islands Natural Heritage Trust, Rarotonga.

McSweeney, CS, Blackall, LL, Collins, E, Conlan, LL, Webb, RI, Denman, SE and Krause, DO (2005a). 'Enrichment, isolation and characterisation of ruminal bacteria that degrade non-protein amino acids from the tropical legume *Acacia angustissima*', *Animal Feed Science and Technology* 121: 191–204.

McSweeney, CS, Collins, EMC, Blackall, LL and Seawright, AA (2008). 'A review of anti-nutritive factors limiting potential use of *Acacia angustissima* as a ruminant feed', *Animal Feed Science and Technology* 147: 158–171.

McSweeney, CS, Gough, J, Conlan, LL, Hegarty, MP, Palmer, B and Krause, DO (2005b). 'Nutritive value assessment of the tropical shrub legume *Acacia angustissima*: anti-nutritional compounds and in vitro digestibility', *Animal Feed Science and Technology* 121: 175–190.

Morton, J (2005). Weed Spotters Newsletter, Summer 2005, Number 2. CRC for Australian Weed Management (CRAWM).

Morton, J (2006). Weed Spotters Newsletter, Autumn 2006, Number 3. CRC for Australian Weed Management (CRAWM).

Navie, SC (2007). FNQ Local Council Priority Weeds. CD-ROM. The University of Queensland, St. Lucia, Brisbane.

Navie, SC and Adkins, SW (2008). Environmental Weeds of Australia: an identification tool. DVD-ROM. The University of Queensland, St. Lucia, Brisbane.

PIER (2006). *Acacia glauca* (L.) Moench, Fabaceae. Pacific Island Ecosystems at Risk (PIER): plant threats to Pacific ecosystems. <[http://www.hear.org/pier/species/acacia\\_glauca.htm](http://www.hear.org/pier/species/acacia_glauca.htm)>. Institute of Pacific Islands Forestry, Hawaii.

Rico Arce, M de L and Bachman, S (2006). A taxonomic revision of *Acaciella* (Leguminosae, Mimosoideae), *Anales del Jardín Botánico de Madrid* 63(2): 189–244.

Robertson, M (2006). Environmental weed management guides for regional Australia. CRC for Australian Weed Management (CRAWM), Adelaide.

Smith, AC (1985). Flora Vitiensis Nova: a new flora of Fiji, Volume 3. National Tropical Botanical Garden, Lawai, Kauai, Hawaii.

Space, JC and Flynn, T (2002). Report to the Government of the Cook Islands on Invasive Plant Species of Environmental Concern. Institute of Pacific Islands Forestry, USDA Forest Service, Honolulu, Hawai'i.

Stehlé, H (1946). 'Taxonomic and ecological notes on the Caesalpiniaceae and Mimosaceae of the French Antilles', *Bulletin du Museum National d'Histoire Naturelle, Series 2* 18: 185–194.



USDA (2009). *Acacia glauca* (L.) Moench, acacia. Plants Profile. <http://plants.usda.gov/java/profile?symbol=ACGL4>. National Plant Data Center, National Resources Conservation Service, United States Department of Agriculture (USDA), Baton Rouge, Louisiana.

Vitelli, JS and Pitt, JL (2007). 'Assessment of current weed control methods relevant to the management of the biodiversity of Australian rangelands', *The Rangeland Journal* 28: 37–46.

Wagstaff, DJ (2008). International Poisonous Plants Checklist: and evidence-based reference. CRC Press, Boca Raton, Florida.

Walton, CS (2003). *Leucaena (Leucaena leucocephala)* in Queensland. Pest Status Review Series—Land Protection. Land Protection, Department of Natural Resources and Mines, Brisbane.