GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Prosopis***

Prosopis 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Fabales	Fabaceae

Common name

catzimec (Spanish, Mexico), aroma americana (Spanish, Puerto Rico), campeche (English, Guatemala), acacia de Catarina (Spanish, Nicaragua), bayahonde (French, Haiti), algarrobo del Brasil (Spanish, Cuba), bayahonde (Spanish, Dominican Republic, Puerto Rico), bayawonn (English, Haiti), screwbeans (English, America), spinho (English, Cape Verde), bohahunda (Spanish, Dominican Republic), belari jari (Tamil, India), aroma (Spanish, Colombia, Philippines, Puerto Rico), anchipia guaiva (Spanish, Colombia, Philippines, Puerto Rico), taco (English, Peru), thacco (English, Peru), aromo (Spanish, Panama), bayahonda (Spanish, Dominican Republic), carobier (French, Marquesas), bayahon (Spanish, Dominican Republic), wawahi (English, Curação), algarobeira (Portuguese, South America), bayahonda blanca (Spanish, Dominican Republic), algarrobo (Spanish, South America), mastuerzos (Spanish, America), tornillos (Spanish, America), yaque negro (Spanish, Venezuela), espino negro (Spanish, Nicaragua), chachaca (Spanish, Cuba, Mexico), chambron (Spanish, Haiti), caóbano gateado (Spanish, Venezuela), carbón (Spanish, El Salvador), espinheiro (Portuguese, Cape Verde), espino ruco (Spanish, Honduras), cujicarora (Spanish, Venezuela), cashaw (English, Jamaica), espino real (Spanish, Honduras), nacasol (Spanish, Guatemala), vilayati khejra (Hindi, India), cashew (English, Jamaica), cují amarillo (Spanish, Venezuela), cují negro (Spanish, Colombia, Venezuela), cují yague (Spanish, Venezuela), cují yaque (Spanish, Colombia, Venezuela), vilayati kikar (Punjabi, India, Pakistan), nacascol (Spanish, Guatemala), mugun kawa (Hausa, Niger), gando baval (Gujrati, India), eterai (Swahili, Kenya), ghaf (Arabic, Middle East states), shouk shami (Arabic, Iraq), shejain kawa (Hausa, Niger), vilayati jand (Punjabi, Pakistan), palo de campeche (Spanish, Guatemala), plumo de oro (Spanish, Cuba), vallahonda (Spanish, Dominican Republic), velikaruvel (Tamil, India), uweif (Arabic, Abu Dhabi), trupillo (Spanish, Colombia), trupi (Spanish, Colombia), velimullu (Tamil, India), bayarone (English, Haiti), vilayati babool (Hindi, India), yaque blanco (Spanish, Venezuela), Mexican thorn (English, Ascension Island), yaque (Spanish, Venezuela), algarrobo forragero (Spanish, Colombia), guatapaná (Spanish, Cuba, Haiti), vilayati babul (Punjabi, India, Pakistan), qui (English, Curação), dakkar toubab (English, Senegal), baron (English, Haiti), angrezi bavaliya (English, India), bayahon (English, Haiti), mesquit-tree (English, Trinidad and Tobago), gaudi maaka (English, Mali), algarroba (English, Virgin Islands), algarrobo americano (Spanish, Puerto Rico), mesquite (Spanish, Colombia, Puerto Rico, Mexico), lebi (English, Somalia), huarango (English, Peru), cuida (English, Curação), guarango (English, Peru), aguijote negro (Spanish, Nicaragua), algarroba (Spanish, Mexico, Puerto Rico), algaroba (English, Hawaii), kiawe (Hawaiian, Hawaii), mathenge (Swahili, Kenya), indjoe (English, Curação), indju (English, Curação), mareño (Spanish, Mexico), kuigi (English, Curação), mesquite (English, Australia, Bahamas, Hawaii, North America, Sudan, South Africa), maíz criollo (Spanish, Venezuela), manca-caballo (Spanish, Colombia, Panama), arómo (Spanish, Costa Rica), bayahonde française (French, Haiti), bayawonn française (English, Haiti), cambrón (Spanish, Cuba, Dominican Republic, Puerto Rico), cojí wawalú (English, Curação), cují (Spanish, Colombia, Venezuela), mezquite (Spanish, Dominican Republic, Mexico, Puerto Rico, North America)

Synonym

Similar species *Acacia farnesiana, Acacia paradoxa, Acacia nilotica ssp. indica, Parkinsonia aculeata*

Summary Members of the genus Prosopis spp., which are commonly known as mesquite or algarrobo, include at least 44 defined species and many hybrids. This leads to problems with identification. For this reason, information about different species in the Prosopis genus is presented in this genus-level profile. Native to the Americas, Prosopis species are fast growing, nitrogen fixing and very salt and drought tolerant shrubs or trees. Most are thorny, although thornless types are known. Animals eat the pods and may spread seeds widely. Trees develop a shrubby growth form if cut or grazed. The four main species that have presented problems as weeds world-wide are P. glandulosa and P. velutina in more subtropical regions and P. juliflora and P. pallida in the truly tropical zone.

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Species Description
Mesquites (*Prosopis* spp.) and thorny shrubs/trees that grow to about 3 metres but can reach 15 metres. *P. pallida* has a main single stem and spreading canopy, *P. velutina* is a compact shrub while the hybrids generally grow as smaller multi-stemmed trees with branches drooping to the ground. Trees can appear rather untidy, with zigzag shaped branches. Leaves are fernlike and vary in shape depending on the species. Foliage is usually dark green but can be blue-green. Spines range in size from 4-75mm long and contribute to form impenetrable barriers (Agriculture & Resource Management Council of Australia & New Zealand, 2000). *Prosopis* are phreatophytes with deep tap roots. This enables trees to remain green during droughts as they can access the water table. Lateral roots draw on surface water during the rains and, in common with other desert specialised palnts, leaf adaptations reduce water loss (Pasiecznik 1999).\n
Burkart (1976) divided the genus into five sections mainly based on floral characteristics. The African section Anonychium contains a solitary, non-thorny species. The three species of the Asiatic section Prosopis all have internodal prickles, similar to those found on roses (*Rosa* spp.). The nine species of section Strombocarpa have spiny stipules with closed spiralled legumes, whereas the thirty species of section Algarobia have cauline, mostly axillary thorns. In between these latter two sections is the single member of section Monilicarpa (Pasiecznik 2001).

Notes
The origin of *Prosopis* given by Perry (1998) was ‘towards abundance’, from the Greek word ‘pros’, meaning ‘towards’, and ‘Opis’, wife of Saturn, the Greek goddess of abundance and agriculture. The name ‘mesquite’ originates from the original Nahuatl Indian name from Mexico, ‘misquitl’ meaning ‘bark that tans’ (Maldonado 1990, in Pasiecznik 2001). In South America, the first *Prosopis* seen by the invading Spaniards were called ‘algarrobo’, because of the observed similarity between these and the carob (*Ceratonia siliqua*) of the Mediterranean basin, both with similar, sweet edible pods (D’Antoni and Solbrig 1977, Cruz 1999, in Pasiecznik 2001).

Lifecycle Stages
Flowering: Different populations of all species vary in the onset of flowering due to climatic variation, however, flowering is also variable within and between trees in the same population. Almost cntinuous flowering of *P. juliflora* is observed in Brazil, India and Haiti (Silva 1990b, Goel and Behl 1995, Timyan 1996, in Pasiecznik 2001). *Prosopis* flowers are produced in masses, mainly on spike-like racemes
Pollination: *Prosopis* species are generally assumed to be self-incompatible, and are primarily insect pollinated. Flowers attract large numbers of potential pollinators with the production of copious amounts of pollen, which contains starch and other nutrients for insects; in particular, bees are intimately associated with legume pollination (Hoc *et al* 1994, Arroyo 1981, in Pasiecznik 2001). Many oligolectic bees are small in size with small flight ranges, and cross pollination is thought to be by larger species of bee. Increased pollination is noted in honey producing areas and is seen to have positive effects on fruit production (Esbenshade 1980, in Pasiecznik 2001).
Fruiting: *Prosopis* species produce pods, which ripen at different times of the year depending on the species and climate. Fruit maturation causes an abscission layer to form at the base of the pedicel and the pods fall to the ground within one to three months in most species. After falling, the seeds become components of the seed bank and are subject to physical and environmental factors and dispersal. Reports show that when collected and stored, seed of *Prosopis* species can remain viable for considerable periods of time, up to 50 years for *P. velutina*; seeds of several species have maintained more than 50% viability over 10 to 15 years when stored in their pods; reports of conservation in the soil seed bank are variable with two and 10 years given for *P. velutina* (Glendening and Paulsen 1955, Pasiecznik and Felker 1992, in Pasiecznik 2001).

Uses
Prosopis trees are the source of multi-purpose valuable products. Fruit pods are high in sugar and protein and are a rich food source for man and beast. Honey produced from *Prosopis* flowers is of high quality, as is gum. *Prosopis* products have added value if processed, such as by turning firewood to finished timber or into furniture. Larger branches and trunks yield a high quality timber comparable in attributes to Indian rosewood or other commercial hardwoods (Pasiecznik 2001 2002b). While shrub species can not be used for timber production they may be browsed occasionally by stock and their leaf litter improves soil quality (Pasiecznik 1999).\r\n
In the Americas, the origin of some *Prosopis* species, there is a history of using all tree parts; for example, tree products from *P. pallida* include wood (for timber, posts, poles, chips, charcoal, firewood); pods (for fodder, flour, syrup, honey, resin gums, fibers, tannins and medicines). From Mexico to Peru, people have developed local economies based *Prosopis juliflora* and its products. Pods are stored year-round for fodder and may be made into flour or nutritious syrup. Honey is made and gums are collected. Products are either for family use or for sale in local markets. In Colombia and Venezuela *Prosopis* is sometimes referred to as ‘maíz criollo’ (‘local maize’), indicating its importance as a nutrient source for either man or animal (Pasiecznik 2002b 2001).\r\n
Trading in products such as wood, food and fodder provides the only source of income for some families in rural India. *Prosopis juliflora* is almost unsurpassable as a fuel in the dry rural areas of this country, and many small farmers, landless and artisans depend on it to cook all their meals. It is often the main source fuel, small roundwood and dry season fodder, and has been called the \"tree of the poor\" by some, indicating its importance to these people (Pasiecznik 2002a 2002b). Aborigines depend on mesquites to reduce dust in the dry regions of Australia. In the Northern Territory, isolated communities use mesquites to minimise erosion around gold and copper mining areas. The trees are also used in Australia, and elsewhere, to provide shade and fodder for cattle. Apparently mesquite charcoal also releases a fragrant scent when burnt (Agriculture & Resource Management Council of Australia & New Zealand, 2000).

Habitat Description
Grows in arid to semi-arid environments including deserts, open woodlands, grasslands, shrublands and floodplains. Mesquites tend to establish most successfully on clay and alluvial soils that have good moisture retention. Soil moisture is more important in determining mesquite distribution than soil type. *P. pallida* has established in areas which receive annual rainfall ranging from 250-1500mm (Agriculture & Resource Management Council of Australia & New Zealand, 2000).\r\n
Prosopis often colonises disturbed, eroded, over-grazed or drought-affected land, associated with unsustainable agronomic practices (such as following the introduction of cattle ranching in the Americas). *Prosopis* trees have many competitive ecological advantages and may form dense, impenetrable thickets. However the seedlings are sensitive, rarely establishing under mature trees or in tall grass. *P. juliflora* and *P. pallida* are not to be unable to persist in areas of southern or Mediterranean Africa that receive frost (Pasiecznik 1999 2001 2002a).

Reproduction
Prosopis spp. produce small greenish-cream “lambs’ tails” flowers that grow near ends of branches in wattle-like spikes. Seedpods are 10 to 20cm long, with slight constrictions between the seeds. Each pod contains 5 to 20 hard seeds. Mesquite generally produces a single crop of seeds per season. Numbers recorded include 630,000 to 980,000 seeds/tree/year, although these numbers have not been recorded in all countries (Agriculture & Resource Management Council of Australia & New Zealand, 2000).

General Impacts
The four main species that have presented problems as weeds world-wide are *P. glandulosa* and *P. velutina* in more subtropical regions and *P. juliflora* and *P. pallida* in the truly tropical zone. *Prosopis* is now a declared weed over millions of square kilometres of arid and semiarid lands, where it drastically reduces the production of forage plants, threatening the livelihoods of ranchers (Pasiecznik 2001). \r\n
In its native range, *Prosopis* increases the density of vegetation. Environmental disturbances typically caused by humans, such as over-grazing and increased bush fire rates (due to poor land management), stimulate *Prosopis* growth and aggravating its effects. In its introduced range the species is much more aggressive. There are dense infestations in areas including but not limited to: Africa (the Sahel region, Sudan, Ethiopia, Kenya, Namibia, South Africa, Eritrea), India, Australia, St Helena (Ascension), and Brazil (Zimmerman Pers. Comm. 2003). \r\n
Prosopis species have received international attention because of their impact on open grassland and woodland ecosystems. They form impenetrable thickets, smother native vegetation and hinder some primary production sectors. Around 1985 the USA experienced production losses of some $200-500 million per year from mesquite infestations (Agriculture & Resource Management Council of Australia & New Zealand, 2000).

Management Info
Preventative measures: A Risk assessment of *Prosopis* spp. for Australia was prepared by Pacific Island Ecosystems at Risk (PIER) using the Australian risk assessment system (Pheloung, 1995). The result is a score of 20 and a recommendation of: reject the plant for import (Australia) or species likely to be a pest (Pacific). Eradication of *Prosopis* has proven to be extremely difficult or impossible. Better management of *Prosopis*, different land use strategies and the exploitation of *Prosopis* as a resource may reduce its invasiveness in some regions as well as improving local economies (Pasiecznik 2002). Examples of better management include: 1) Stand conversion and improvement- Weedy stands thinned to 100-400 trees per hectare, in stages. Broad strips cleared and cut stumps are removed manually/mechanically, treated by stripping the bark or treated with used motor oil/triclopyr and diesel mixture. Animals may re-enter immediately as these chemicals have little mammalian toxicity. Selected trees in the remaining rows are pruned to single stems at final spacings of 5 by 5 metres to 10 by 10 metres. The cost of the operation should be at least covered by the charcoal, wood chips and small timber obtained from operation; 2) Pruning appears to be the single most important technique in improving tree and understorey yields. Weedy shrubs are turned into valuable, productive trees by removal of side branches. Regularly pruned trees are found to have smaller root systems, use soil water more efficiently and compete less with neighbouring crops and grasses. Stands can be improved by introducing thornless or high yielding varieties or by grafting or interplanting; 3) Prevention- *Prosopis* seedlings rarely establishing under mature trees or in tall grass. Re-invasion can be minimised by maintaining a high-pruned tree canopy and improved understorey management. A reduction in stocking rates, for example, can encourage good grass cover, preventing *Prosopis* seedling establishment. Destroying seed, by the collection and use of pods for stall feeding or processing, reduces re-invasion. A change of livestock from cattle to sheep or pigs (which kill most to all of seeds ingested) also limits *Prosopis* spread
The Best Practice Manual Mesquite Control and management options for mesquite (*Prosopis* spp.) in Australia aims to provide the most current information on mesquite in Australia. The control and management options presented in this manual are the combined results of years of trials carried out by many dedicated researchers, landholders, herbicide companies, government officers, landcare groups and others. As mesquite species respond differently to control methods, the most effective method or combination of methods will vary depending on the size, density and species of mesquite present. The manual includes a 'mesquite control tool box'. Included also are a number of case studies to demonstrate best practice.

Pathway
Prosopis spp. have been introduced into countries for use in agroforestry (Zimmerman Pers. Comm. 2003).When livestock are moved by road transport and between paddocks on individual properties, this becomes the single most important mechanism for the long distance dispersal of mesquite. In Australia in particular any attempts to control and contain the weedHumans have transported the plant across the landscape and across the world for use as an ornamental tree (Agriculture & Resource Management Council of Australia & New Zealand, 2000).

Principal source: Agriculture & Resource Management Council of Australia & New Zealand, 2000. Australian & New Zealand Environment & Conservation Council and Forestry Ministers. Weeds of National Significance Mesquite (*Prosopis* species) Strategic Plan. National Weeds Strategy Executive Committee, Launceston.
Australian Weeds Committee, 2008. Weeds of National Significance. Mesquite
Mwangi, Esther & Brent Swallow, June 2005, Invasion of *Prosopis juliflora* and local livelihoods: Case study from the lake Baringo area of Kenya. ICRAF Working Paper – no. 3. Nairobi: World Agroforestry Centre

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

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ALIEN RANGE

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[2] REUNION
[1] SAINT HELENA
[1] SENEGAL
[1] SRI LANKA
[1] TANZANIA, UNITED REPUBLIC OF
[1] TUNISIA
[2] UNITED STATES
[1] WEST INDIES

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Managment information

Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000. Weeds of National Significance Mesquite (*Prosopis* species) Strategic Plan. National Weeds Strategy Executive Committee, Launceston.

Summary: Available from: http://www.weeds.org.au/docs/msqstrat.pdf [Accessed November 13 2009]

Australian Weeds Committee, 2008. Weeds of National Significance. Mesquite

Summary: This site provides information on the strategy for the management of Mesquite (*Prosopis*). Documents available for download include the strategy, Mesquite control manual, brochures, posters and current and potential distribution maps.
Available from: http://www.weeds.org.au/WoNS/mesquite/ [Accessed 23 October 2008]

Cooperative Research Centre (CRC) for Australian Weed Management, 2003. Weed Management Guide: Mesquite *Prosopis* species. CRC for Australian Weed Management the Commonwealth Department of the Environment and Heritage and the Queensland Department of Natural Resources and Mines

Summary: Available from: http://www.weeds.gov.au/publications/guidelines/wons/pubs/prosopis.pdf [Accessed 13 November 2009]

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.

Mwangi, Esther & Brent Swallow., 2008. *Prosopis juliflora* Invasion and Rural Livelihoods in the Lake Baringo Area of Kenya. Conservation & Society Year : 2008, Volume : 6 Issue : 2 Page : 130-140
Summary: Global concern about deforestation caused by fuelwood shortages prompted the introduction of *Prosopis juliflora* to many tropical areas in the 1970s and 1980s. *P. juliflora* is a hardy nitrogen-fixing tree that is now recognised as one of the world s most invasive alien species. The introduction and subsequent inva&#65533;sion of *P. juliflora* in the Lake Baringo area of Kenya has attracted national media attention and contra&#65533;dictory responses from responsible agencies. This paper presents an assessment of the livelihood effects, costs of control and local perceptions on *P. juliflora* of rural residents in the Lake Baringo area. Unlike some other parts of the world where it had been introduced, few of the potential benefits of *P. juliflora* have been captured and very few people realise the net benefits in places where the invasion is most ad&#65533;vanced. Strong local support for eradication and replacement appears to be well justified. Sustainable utilisation will require considerable investment and institutional innovation
Mwangi, Esther & Brent Swallow, June 2005, Invasion of *Prosopis juliflora* and local livelihoods: Case study from the lake Baringo area of Kenya. ICRAF Working Paper &#65533; no. 3. Nairobi: World Agroforestry Centre
Summary: Also available from: http://www.worldagroforestry.org/downloads/publications/PDFs/wp03mwangi.pdf [Accessed 12 November 2009]
Osmond, Rachele, 2003. Best Practice Manual Mesquite Control and management options for mesquite (Prosopis spp.) in Australia. This manual is sponsored by the National Weeds Program (Natural Heritage Trust) and the Queensland Department of Natural Resources and Mines.
Summary: Available from: http://www.weeds.org.au/WoNS/mesquite/ [Accessed July 15 2010]
Pasiecznik, N. 2002. *Prosopis (Mesquite, Algarrobo): Invasive Weed or Valuable Forest Resource?*. Forestry Research Programme HDRA (Henry Doubleday Research Association).
Zimmerman H. 2003. Pers. Comm. (email)
Summary: An email describing the two-fold nature of the impact of *Prosopis* spp. in a global context, as well as highlighting the problem of *Prosopis* species-specific classification (due to high hybridisation levels in mixed-*Prosopis* spp. communities).

General information

Pasiecznik, N. 1999. *Prosopis - Pest or Providence, Weed or Wonder Tree?* In: W. Brinkman (ed.) European Tropical Forest Research Network News 28. The Tropenbos Foundation (ETFRN).
Summary: Available from: http://www.etfrn.org/etfrn/newsletter/frames/nl28.html [Accessed 15 February 2005]
Pasiecznik, N. 2001. *The Prosopis juliflora - Prosopis pallida Complex: A Monograph*. HDRA: Coventry (UK).
Pasiecznik, N. 2002. *Prosopis juliflora (Vilayati Babul) in the Drylands of India: Develop This Valuable Resource &#65533; Don&#65533;t Eradicate it*. HDRA: Coventry (UK).