

LOCAL NAMES

Arabic (mesquite); Creole (bayawonn, bayawonn fran); English (ironwood, algarroba, honey mesquite, mesquite, mesquite bean); Filipino (aroma); French (bayahonda, chambron, bayarone, bayahonde francais); German (mesquitebaum); Hindi (vilayati khejra, vilayati babul, ganda-babul, vilayati kikar); Spanish (algarroba, bayahonda blanca, algarrobo cují, bayahon, algarrobo, bohahunda, cambrón, espino rucco, guatapaná, mesquite, plumo de oro, vallahonda, chachaca); Swahili (kikwajukwaju)

BOTANIC DESCRIPTION

Prosopis juliflora is an evergreen tree with a large crown and an open canopy, growing to a height of 5-10 m. Stem green-brown, sinuous and twisted, with axial thorns situated on both sides of the nodes and branches. Bark somewhat rough; dull red. The root system includes a deep taproot.

Leaves compound; leaflets in 13-25 pairs, oblong (3 x 1.7 mm) and dark green, bipinnate with 1 or sometimes 2 pairs of rachis, almost pendulous.

Flowers lateral to the axis with a tubular, light greenish-yellow, 1.5 mm wide calyx with hooded teeth; corolla light greenish-yellow, composed of 5 petals with 3 mm wide pubescent along its edges.

Fruit a non-dehiscent pod, straight, linear, falcate to annular, with a coraceous mesocarp in 1 segment or divided into several segments; seeds compressed, ovoid, hard, dark brown, with mucilaginous endosperm surrounding the embryo; cotyledons flat, rounded, epigenous when germinating.

BIOLOGY

P. juliflora inflorescence is small, green-yellowish spikes without any particular fragrance or attractiveness, though relished by bees. Flowering begins at the age of 3-4 years. In India, *P. juliflora* flowers twice a year, in February-March and August-September, and is a prolific seeder. The pods from autumn flowering mature by May or early June and are dispersed before the onset of the monsoon. In drought years, autumn flowering is extremely affected, with trees often failing to flower, but these same trees flower and fruit subsequently when there is adequate rainfall. The bisexual, pealike flowers are cross-pollinated by wind and insects. The seed is disseminated and pretreated by the agency of animals that feed on the pods.



P. juliflora, contour planting, Saotiago, Cape Verde Islands. (David Boshier)



P. juliflora, plantation with pods, Saotiago, Cape Verde Islands. (David Boshier)



P. juliflora, line plantings intercropped with maize, Saotiago, Cape Verde Islands. (David Boshier)

ECOLOGY

P. juliflora is xerophytic and is adapted to many soil types under a wide range of moisture conditions. The value of the tree lies in its exceptional tolerance of drought and marginal soils. It tolerates strongly saline soils and seasonal waterlogging. *P. juliflora* has been planted successfully on soils with acid to alkaline reaction. It is sometimes said to dry out the soil and compete with grasses, particularly in dry areas; hence in some areas it is considered a weed.

BIOPHYSICAL LIMITS

Altitude: 0-1 500 m, Mean annual temperature: 14-34 deg. C, Mean annual rainfall: 50-1 200 mm

Soil type: It can grow on a variety of soils including rocky hills, saline flats, on shifting sand dunes and coastal sand, although it attains its best size in localities protected from wind and having the water table not far below the surface. It can grow in waterlogged conditions and is tolerant to high salinity.

DOCUMENTED SPECIES DISTRIBUTION

- Native: Argentina, Belize, Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, United States of America
- Exotic: Australia, Bahamas, Barbados, Brazil, Brunei, Cambodia, Cuba, Dominica, Dominican Republic, Grenada, Haiti, India, Indonesia, Iran, Jamaica, Kenya, Laos, Malaysia, Myanmar, Pakistan, Papua New Guinea, Philippines, Puerto Rico, Senegal, South Africa, Sri Lanka, St Lucia, St Vincent and the Grenadines, Sudan, Tanzania, Thailand, Trinidad and Tobago, Uganda, Vietnam, Virgin Islands (US)



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS

Food: A rich, delicious flour can be made from pulverized pods from which seeds have been removed. Cotyledons and embryos when pulverized yield a flour rich in protein and sugar appropriate for diabetic people. There are reports that *P. juliflora* pods are used in preparing bread, sweets, syrup and coffee. The pods must be processed to improve the flavour. Sugars and sweeteners can be produced from the pods.

Fodder: For dairy cows, the flour may make up 40-60% of concentrate rations. In South Africa, it is fed unmixed to sheep. Ripe pods contain 12-14% crude protein. The short-fibred parts are also suitable for pigs and poultry.

Apiculture: This species is a major honey source in Bolivia, Jamaica, Pakistan, western Australia and elsewhere. In Sri Lanka, it is one of the most important species for bee forage due to its very copious nectar flow.

Fuel: The generally crooked stems and branches make good firewood and provide excellent charcoal. Charcoal from *P. juliflora* wood is used extensively in the USA as barbecue fuel; about 30% of the charcoal sold for this purpose originates from *P. juliflora* from the Sonora Desert in northern Mexico.

Fibre: There is a large potential for *P. juliflora* as a source for fibre in the production of paper, paperboard and hardboard.

Timber: Seasoned wood is used for fence posts, furniture, crafts and corrals. It is rarely used in construction, as most tree trunks are not long or straight enough.

Gum or resin: *P. juliflora* heartwood contains significant amounts of extractable polyphenolic compounds from which can be isolated a unique flavinol compound used in the formation of new phenol-formaldehyde polymeric resins. A reddish-amber gum, similar in properties to the gum arabic produced by *Acacia senegal*, often exudes from the stem and older branches.

Tannin or dyestuff: Tannin or dyestuff can be extracted from *P. juliflora* but the yield is only about 10%. Tannin could also be extracted as a byproduct when *P. juliflora* wood is processed for other purposes, such as animal rations.

Alcohol: In Argentina, Chile and Peru the pods are an important item in making alcoholic drinks such as cocktails.

Medicine: *P. juliflora* syrup prepared from ground pods has various medicinal values. It is given to children showing weight deficiency or retardation in motor development, the syrup is believed to increase lactation. It is also used for preparing various medicinal syrups, particularly for expectorants. Tea made from *P. juliflora* is thought to be good for digestive disturbances and skin lesions.

SERVICES

Erosion control: *P. juliflora* has been used to arrest wind erosion and stabilize sand dunes on coastal areas. It is listed as on the tree species used in sand-dune stabilization in India.

Shade or shelter: Planted in windbreaks and shelterbelts.

Reclamation: Widely planted for land reclamation because it is an aggressive colonizer, tolerant of very poor, degraded, saline and alkaline soils. In the USA, aerial seeding of a mixture of *P. juliflora*, *Nicotiana glauca* and several *Eucalyptus* species is used to revegetate abandoned copper mines.

Nitrogen fixing: *P. juliflora* moderately enriches the soil with atmospheric nitrogen obtained through symbiosis with cowpea-type *Rhizobium*. The roots also form mycorrhizal associations with *Glomus* fungi. Plants with both *Rhizobium* and mycorrhizal associations show significantly higher nitrogen fixation rates than those lacking the mycorrhiza.

Soil improver: Total nitrogen, sulphur and soluble salts, as well as organic matter, have been shown to increase 3-fold in the upper 4.5 m of soil under *P. juliflora*.

Intercropping: The best species to grow in association with *P. juliflora* are *Cenchrus ciliaris*, *Opuntia* spp. and *Panicum maximum*.

Ornamental: *P. juliflora* is used to line urban motorways. However, its thorns pose problems for pruning and maintenance.

TREE MANAGEMENT

The tree normally grows to a height of about 10 m, but under favourable conditions it may reach 20 m. Spacing depends on the use intended for the trees. In South America when grown for fuelwood, a spacing of 2 x 2 m or wider is used. In rangeland in association with grasses and other crops, the spacing may be up to 10 x 10-15 m. When the emphasis is on pod production, the spacing used is usually 5 x 5-10 m. Young plants benefit from weeding around the stem and need protection from grazing animals. Thinning and pruning are needed to prevent *P. juliflora* from becoming a weed and to keep the plantation accessible. *P. juliflora* coppices readily. Because of its aggressive nature, it is considered a noxious weed in more humid areas, e.g. the southern USA.

GERMPLASM MANAGEMENT

Seed storage behaviour is orthodox; 60% germination following 50 years storage; viability can be maintained for several years in hermetic storage at 10 deg. C with 5-9% mc; no loss in viability following 24 hours of immersion in liquid nitrogen for seeds at 7% mc and 5% mc. There are 20 000-26 000 seeds/kg.

PESTS AND DISEASES

In South America, the wood sawyer insect *Oncideres saga*, which cuts off young branches, causes considerable damage. Other pests reported from South America are the lycainid butterfly *Hemiargus ramon*, which damages the flowers, and the lonchaeid fly, *Silba pendula*, and *Bruchus* beetles, which attack the pods. The membracid treehopper, *Otinotus oneratus*, is reported in India to cause damage.

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SUGGESTED CITATION

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