

Prosopis juliflora DC.



Prosopis chilensis (Mol.) Stuntz is often considered synonymous, but see Burkart, 1976.

Mimosaceae

Velvet mesquite

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Uses

Mesquite pods are among the earliest known foods of prehistoric man in the new world. Today flour products made from the pods are still popular, although only sporadically prepared, mostly by Amerindians. Pods are made into gruels, sometimes fermented to make a mesquite wine. The leaves can be used for forage. Providing good bee pasturage also, nectar from mesquite yields a superior honey. The wood is used for parquet floors, furniture, and turnery items, fencepost, pilings, as a substrate for producing single-cell protein, but most of all for fuel. Toasted seeds are added to coffee. Bark, rich in tannin, is used for roofing in Colombia. The gum forms an adhesive mucilage, used as an emulsifying agent. Gum is used in confectionary and mending pottery. Roots contain 6–7% tannin, which might discourage Rhizobia.

Folk Medicine

According to Hartwell (1967–1971), the juice is used in folk remedies for that cancerous condition he terms "superfluous flesh." Reported to be cathartic, cyanogenetic, discutient, emetic, POISON, stomachic, and vulnerary, mesquite is a folk remedy for catarrh, colds, diarrhea, dysentery, excrescences, eyes, flu, headcold, hoarseness, inflammation, itch, measles, pinkeye, stomachache, sore throat, and wounds (Duke and Wain, 1981). Pima Indians drank the hot tea for sore throat (Lewis and Elvin-Lewis, 1977). Aqueous and alcoholic extracts are markedly antibacterial.

Chemistry

Per 100 g, the flower is reported to contain (ZMB): 21.0 g protein, 3.2 g fat, 65.8 g total carbohydrate, 15.5 g fiber, 10.0 g ash, 1,310 mg Ca, and 400 mg P. Leaves contain 19.0 g protein, 2.9 g fat, 69.6 g total carbohydrate, total carbohydrate, 21.6 g fiber, 8.5 g ash, 2,080 mg Ca, and 220 g P. Fruits contain 13.9 g protein, 3.0 g fat, 78.3 g total carbohydrate, 27.7 g fiber, and 4.8 g ash. Seeds contain (ZMB) 65.2 g protein, 7.8 g fat, 21.8 g total carbohydrate, 2.8 g fiber, and 5.2 g ash. (FAO, 1981a). Another analysis of the fruit shows 14.35% water (hygroscopic), 1.64% oil, 16.36% starch, 30.25% glucose, 0.85% nitrogenous material, 5.81% tannin-like material, 3.5% mineral salts, and 27.24% cellulose. Mesquite gum readily hydrolyses with dilute sulfuric acid to yield L-arabinose and D-galactose and 4-o-methyl-D-glucuronic acid at 4:2:1. Owing to the high content of arabinose, the gum is an excellent source of sugar. Roots contain 6.7% tannin, bark 3–8.4%, and dry wood 0.9%. The alkaloids 5-hydroxytryptamine and tryptamine are reported from this species (Simpson, 1977).

Toxicity

According to Mitchell and Rook, the thorn from mesquite, on penetrating the eye, causes more inflammation than expected from the physical injury. The irritation may be due to waxes. Injection of cerotic acid is destructive to the eye. (Still Amerindians applied the leaves for conjunctivitis.) Using the wood in a fireplace has caused dermatitis, as has working with seasoned wood. The gum has irritant properties. Reports on cattle toxicity vary. Lewis and Elvin-Lewis (1977) report that ingestion over long periods of time will result in death in cattle. Further, they report that the pollen may cause allergic rhinitis, bronchial asthma, and/or hypersensitivity pneumonitis. Kingsbury (1964) goes into some detail on mesquite poisoning in cattle, including cases where autopsies showed pods and seeds in the rumen 9 months after the cattle could have ingested them. Mesquite poisoning may induce a permanent impairment of the ability to digest cellulose. Felker and Bandurski (1979) also provide interesting detail. If *Prosopis* pods are the sole food source for cattle, ca 1% become sick, and some die with a compacted pod ball in the rumen. Death is attributed to high sugar content repressing the rumen-bacterial cellulose activity. Mesquite feeding to pigs was promising during the first four weeks, deteriorating thereafter, perhaps due to phytohemagglutinins and trypsin inhibition. Feeding trials with sheep show a 15% higher protein digestibility coefficient for mesquite pods than for alfalfa hay. Trypsin inhibition has been demonstrated the TI content 1.4 TIU/mg (Del Valle et al., 1983). Contains isorhamnetin 11 3-glucoside, apigenin 6, 8-diglycoside, and traces of quercetin 3',3diOMe, leutolin 3'-OMe, and apigenin diglycoside (Simpson, 1977).

Description

Perennial deciduous thorny shrub or small tree, to 12 m tall; trunk to 1.2 m in diameter, bark thick, brown or blackish, shallowly fissured; leaves compound, commonly many more than 9 pairs, the leaflets mostly 5–10 mm long, linear-oblong, glabrous, often hairy, commonly rounded at the apex; stipular spines, if any, yellowish, often stout; flowers perfect, greenish-yellow, sweet-scented, spikelike; corolla deeply lobate. Pods several-seeded, strongly compressed when young, thick at maturity, more or less constricted between the seeds, 10–25 cm long, brown or yellowish, 10–30-seeded. Seed compressed and oval or elliptic, 2.5–7 mm long, brown (Reed, 1970).

Germplasm

Reported from the South American Center of Diversity, mesquite, or cvs thereof, is reported to tolerate drought, grazing, heavy soil, sand, as well as saline dry flats and weeds. Some Argentine germplasm tolerated mild frost at 40° S latitude. ($2n = 28, 52, 56, 112$) (Zevin and Zhukovsky, 1975, Simpson, 1977).

Distribution

Originally Central and/or South American, the mesquite is now pantropically introduced and establishing, often as a weed. It is classified as a principal weed in Mexico, a common weed in the US (but does not naturally occur in the US, this report due to the long prevailing taxonomic confusion), and a weed in Australia, Dominican Republic, India, Iraq, and Venezuela. According to the NAS, the tree ranges from sea level to 1,500 m. According to the taxonomic work of Burkart (1976), neither *P. juliflora* nor *P. chilensis*, as now defined, occur in the US.

Ecology

Probably ranging from Tropical Thorn to Dry through Subtropical Thorn to Dry Forest Life Zones (with little frost), mesquite is reported to tolerate annual precipitation of 1.5 to 16.7 dm (mean of 29 cases = 9.9), annual temperature of 20.3 to 28.5°C (mean of 21 cases = 25.5), and pH around neutral (Ecosystematic Data Base) (NAS, 1980a).

Cultivation

Propagated, if need be (weeds rarely need be), by seed, root suckers, and hardwood cuttings. Hot water or acid treatment will expedite seed germination. In India, seeds collected in May–June may be sown right after collection, but September–October seed are not sown until April. For line fencing, seeds may be sown in two adjacent rows ca 50 cm apart, with a spacing of 30 cm between the sowings. Transplanting one-year olds in the rainy season is preferable to direct sowing. Root and shoot cuttings with minimum diameter 12.5 mm at the collar and 100 mm long are satisfactory (C.S.I.R., 1948–1976). Pot studies have shown water requirements of nearly 5,000 cm³ per g of dry matter (Felker et al, 1981).

Harvesting

Bearing fruits in 3 to 4 years, the trees are usually harvested by hand, often after the fruits have fallen.

Yields and Economics

Felker and Bandurski (1979) estimate 2,000 kg/ha pods for such species as *Prosopis juliflora* in unmanaged Arizona desert, 4,000–20,000 kg/ha pods in arid Hawaiian savannas. Speaking of wood, the NAS (1980a) states that on a 15-year rotation, expected yields are 75–100 MT/ha, on 10-year rotation, 50–60 MT, suggesting wood yields of 5–7.5 MT/ha/yr over and above the fruit yields. According to TIME (March 12, 1984, p. 70), mesquite wood is selling for nearly \$5.00 a kilogram. TIME quotes Joe Messina, founder of Mesquite Treat Enterprises, as saying that in Arizona mesquite costs about \$100 a cord, which in dry wood approximates 3,000 lbs. In one instance, Messina cleared the mesquite off the land of a grateful farmer, free for the chopping. He sells the wood to restaurants in 50-lb. bags at \$12.50 for logs, \$17.50 for chunks, and \$20 for chips. All this because "Mesquite grilling imparts a sweet smoky burnishing of flavor...an almost imperceptible flavor to fish, though a more pronounced and interesting one to shrimp." (TIME, Mar. 12, 1984). Galt et al. (1982) showed that a mesquite free pasture (annual precipitation ca 4 dm) produced 1,165 kg/ha forage compared to 818 kg/ha (17% mesquite) on the mesquite pasture. Burkart (1943) cites studies showing yields of 87 hectoliters/ha in the wild. He also cites Indian studies suggesting that bees can harvest nectar more than enough for 1 kg of honey.

Energy

Fast-growing, drought resistant, and with remarkable coppicing power, *Prosopis* is a natural fuelwood candidate. With specific gravity 0.70 or higher, the wood has been termed "wooden anthracite", because of its high heat content, burning slowly and evenly and holding heat well. This species provides >90% of the

fuelwood in some Indian villages (Sharma, 1981). Although no direct data on N-fixation of *Prosopis* are available, Felker and Bandurski (1979) suggest that tree legumes (exclusive of Caesalpiniaceae) fix between 155 and 580 kg/ha/yr. Soils under the crowns of legumes in the desert usually have 10 times more N (0.3%) than those under non nitrogen fixers (0–03%).

Biotic Factors

Fungi reported on this or related species include *Agrobacterium tumefaciens*, *Cerospora prosopidis*, *Didymosphaeria cryptosphaerioides*, *Fomes everhartii*, *F. rimosus*, *Gloesporium leguminum*, *Leveilulla taurica*, *Napicladium prosopodium*, *Phoma* sp., *Phyllosticta juliflora*, *Phymatotrichum omnivorum*, *Physalospora mutila*, *Polyporus adustus*, *P. pinsitus*, *P. texanus*, *Ravenelia arizonica*, *R. holwayi*, *Schizophyllum commune*, *Scleropycnium aureum*, *Septoria prosopidis*, and *Sphaeropsis prosopidis*. Among the Coleoptera, *Amblycerus* sp., *Apate monachus*, *Bruchidius uberatus*, *Caryedon serratus*, *Celosterna scabrator*, *Oncideres putator*, *Rhipibruchus prosopis*; among Hemiptera, *Icerya formicarum*, and *Oxyrhachis tarandus*; among Isoptera *Anacanthotermes macrocephalus*; among Nematoda *Meloidogyne* sp. Galt et al. (1982) show the botanical composition of mesquite pastures on the Santa Rita Experiment Range. Felker et al. (1981) review the pest infestations of their *Prosopis* plantings with suggestions for their control.

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[Complete list of references for Duke, Handbook of Energy Crops](#)

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