FabaceaeCPea family

Hymenaea courbaril L.

courbaril

J.A. Vozzo

Dr. Vozzo is a research plant physiologist at the USDA Forest Service=s Southern Research Station, Mississippi State, Mississippi.

Other common names. jutaby, cuapinol, algarrobo.

Occurrence and growth habit. CourbarilC*Hymenaea courbaril* L.Cis a large tree, about 45 m tall, relatively slow growing (about 1 m/year) with a well-formed clean trunk. It develops best on sandy, drained ridges and river banks (but not well in wetlands) and is normally found in open sites from southern Mexico, Central America, and the West Indies, to northern South America. It is found in a variety of soils, such as clay to sand, occurring predominantly in oxisols, with a pH range from 4.8 to 6.8. It grows best in areas with 1,900 to 2,150 mm of rainfall, and from sea level to about 900 m. It coppices well in cut-over areas except from large stumps and can also be propagated from cuttings. Courbaril is the most widespread of the 17 species in the genus. There is 1 African species and the remaining species are found in neotropical America. Courbaril readily forms forest associations in semi-deciduous, secondary, moist subtropics (Rzedowski 1981). It is also reported in nearly pure stands in Mexico (Weaver 1987).

Use. Courbaril=s basic use is for timber. The wood is strong, hard, tough; it is difficult to saw, machine, and carve but bends well after steaming. It is commercially useful for flooring, handles, sporting equipment, furniture, and railroad ties (Chudnoff 1984). Its heartwood has a specific gravity of about 0.70 g/cm^3. Although courbaril wood is resistant to white-rot fungi (less to brown-rot) and termites, it has little resistance to marine borers. It does not weather well and does require painting (Francis 1990; Longwood 1962). It has limited ornamental use for shade, parks, and streets because of its heavy legumes and their offensive odor of the broken legumes as seeds mature. Although it has a limited appeal, the seed pulp is a good dietetic source of sugar and high in fiber when eaten plain or toasted or drunk as a fermented beverage. It is also given to livestock. According to local folk medicine, a bark infusion is used as a laxative and the fruit pulp as an antidiarrheal (Liogier 1978).

Flowering and fruiting. Large trees with full, overhead light usually flower during spring and summer. Terminal racemes bear white flowers about 4 cm wide. Mature legumes measure 5 to 10 cm long, 2 to 3.5 cm wide, and 2.5 cm thick and fall during the following spring. The thick, hard legume does not open naturally, but protects 3 or 4 large seeds encased in a powdery, cream-colored pulp (Liogier 1978). Small animalsCsuch as agouties (*Tayassu* spp.) and peccaries (*Dasyprocta* spp.)Copen the legumes to eat the pulp and seeds. Legumes have a protective gum that delays rotting for several months; until the seeds begin to take up moisture for germination; otherwise seeds will rot in their legumes (Jansen 1983).

Collection and storage. Seeds collected from Puerto Rico average about 253/kg (115/lb) (Francis 1990), whereas those from Brazil yield 475/kg (215/lb) (Pereira 1982). A single tree may produce 100 legumes/year but not necessarily each year. Because of the height of the trees, the legumes are usually picked manually from the ground, and seeds are obtained from fresh legumes fallen in spring (Jansen 1983). After-ripening causes an actual germination enhancement during the first 4 months after collection. This may also account for the long (9-month) period seeds remain in the legume on the tree before falling. Courbaril seeds are orthodox in storage behavior and store relatively well with acceptable germination for periods in excess of 1 year. However, the conditions for optimal storage changes with time. For the first year, sealed containers are preferable at ambient temperatures; after that, seeds should be refrigerated or kept in unsealed bags (Marrero 1943).

Germination. Simple scarification or a 1-hour soak in sulfuric acid is necessary as a germination pretreatment (Marshall 1939). After imbibition, seeds may be germinated in potting mix for 14 to 21 days with up to 90% germination (Francis and Rodriquez 1993; Marrero 1949). Seeds can be germinated at ambient temperature in either potting mixture or sand placed in shallow trays; or moistened filter or blotter paper in petri dishes.

Nursery practice. Container stock may be grown in either full sun or 50% shade. However, seedlings grown in full sun are ready for outplanting about 2 weeks earlier than seedlings grown in shade (Pereira 1982; Francis 1990). Although courbaril may be direct-seeded or underplanted, success is greater with containers unless seeds can be given greater protection. A large taproot with a well-developed fibrous net grows deeply and may or may not have associated nitrogen-fixing nodules (Allen and Allen 1981). Seeds may be infected by a bruchid beetle, *Pygiopachymerus* sp. (Decelle 1979); a weevil, *Rhinochenus* sp. (Jansen 1975); and an ant, *Atta* sp. (Jansen 1983).

Literature Cited

Allen ON, Allen EK. 1981. The Leguminoseae: a source book of characteristics, uses, and nodulation. Madison: University of Wisconsin Press. 812 p.

Chudnoff M. 1984. Tropical timbers of the world. Agric. Handbk. 607. Washington, DC: USDA Forest Service. 466 p.

Decelle J. 1979. *Pygiopachymerus lineola* (Chevr.), coleoptere bruchide neotropical introduit a Tahiti. Bulletin et Annales de la Societe Royale Belge d=Entomologie. Tervuren, Belgium: Musee Royale de l=Afrique Centrale.

Francis JK. 1990. *Hymenaea courbaril* (L.). SO-ITF-SM 27. New Orleans: USDA Forest Service, Southern Forest Experiment Station. 5 p.

Francis JK, Rodríguez A. 1993. Seeds of Puerto Rican trees and shrubs: second installment. Res. Note SO-374. New Orleans: USDA Forest Service, Southern Forest Experiment Station. 5 p.

Jansen DL. 1975. Behavior of *Hymenaea courbaril* when its predispersal seed predator is absent. Science 189(4194): 145B147.

Jansen DL. 1983. Costa Rican natural history. Chicago: University of Chicago Press. 816 p.

Liogier AH. 1978. Arboles Dominicanos. Santo Domingo, Dominican Republic: Academia de Ciencias de la Republica Dominicana. 220 p.

Longwood FR. 1962. Present and potential commercial timbers of the Caribbean. Agric. Handbk. 207. Washington, DC: U.S. Department of Agriculture. 167 p.
Marrero J. 1943. A seed storage study of some tropical hardwoods. Caribbean Forester 4(3): 99B106.
Marrero J. 1949. Tree seed data from Puerto Rico. Caribbean Forester 10(1): 11B36.
Marshall RC. 1939. Silviculture of the trees of Trinidad and Tobago, British West Indies. London: Oxford University Press. 247 p.
Pereira AP. 1982. Ensaios em viveiro florestal e fruitificacao de algumas especies Amazonicas. Silvicultura em Sao Paulo 16A(2): 1135B1138.
Rzedowski J. 1981. Vegetacion de Mexico. Mexico City, DF: Editorial Limusa. 432 p.
Weaver PL. 1987. Tree growth in several tropical forests of Puerto Rico. Res. Pap. SO-152. New Orleans: USDA Forest Service, Southern Forest Experiment Station. 15 p.