Hymenaea courbaril L.

J.A. VOZZO
Southern Research Station,
USDA Forest Service

FABACEAE (BEAN FAMILY)

No synonyms

Algarrobo, algarrobo de las Antillas, caguairan, copal, copinol, corobore, courbaril, cuapinol, curbaril, guapinal, guapinol, jatoba, jutaby, jutahy, locus, locust, loksi, nazareno, rode locus, simiri, stinking-toe, West-Indian-locust (Little and Wadsworth 1964)

Of the 17 species in the genus, 16 are found in neotropical America, with *H. courbaril* the most widespread. The one remaining species is African. *Hymenaea courbaril* forms forest associations readily in semideciduous, secondary, moist subtropics (Rzedowski 1981). The species is normally found in open sites from southern Mexico, Central America, and West Indies, to northern South America, and uncommonly in southern Florida. Specifically, it ranges from Cuba and Jamaica to Trinidad and Tobago in the West Indies; and from Mexico through Peru, Bolivia, Brazil, and French Guiana (Little and Wadsworth 1964). It is reported in almost pure stands in Mexico (Weaver 1987).

Hymenaea courbaril is a slow-growing, well-formed tree with a clean trunk. It grows about 1 m per year to about 45 m in height. It develops best on sandy, drained ridges and although found on river banks, it does not grow well in wetlands. The tree grows in a variety of soils from clay to sand but is predominant in oxisols with a pH range from 4.8 to 6.8. Occurring from sea level to about 900 m, it grows best in areas with annual rainfall of 1,900 to 2,150 mm.

Basically a timber tree, *H. courbaril* has a heartwood specific gravity of about 0.70. The wood is strong, hard, tough, and difficult to saw, machine, or carve. The lumber does bend well after steaming. It is commercially useful for flooring, handles, sporting equipment, furniture, and railroad ties (Chudnoff 1984). Indians used the bark for canoes, stripping it in one piece from a large tree (Little and Wadsworth 1964). Although gastronomically unappealing, the seed pulp is a good dietetic sugar source and is high in fiber. In folk medicine, the bark is used as a laxative and the seed pulp as a diarrhea remedy (Liogier 1978). Resistant to white-rot fungi (less to brown-rot) and termites, *H. courbaril* has little resistance to marine borers. The wood does not weather well and requires painting (Francis 1990b, Longwood 1962). It has limited ornamental use as a shade tree in parks and on streets because the heavy seed pods emit an offensive odor as they mature and can cause damage or injury when they fall.

Flowers appear in spring and summer on large trees that grow in full, overhead light. Terminal racemes bear white flowers about 4 cm wide. Mature seed pods 5 to 10 cm long, 2 to 3.5 cm wide, and 2.5 cm thick fall the following spring. The thick, hard seed pods protect three to four large seeds encased in a powdery, cream-colored pulp and do not open naturally (Liogier 1978). Small animals (agouties, peccaries) open the pods to eat both seeds and pulp. The pods also have a protective gum that delays rotting for several months, allowing seeds to imbibe moisture in preparation for germination (Jansen 1983). A single *H. courbaril* tree may produce 100 pods in 1 year but not necessarily every year.

Because tree height usually discourages manual collection, seeds are collected from fresh pods when they fall in the spring (Jansen 1983). Overripening enhances germination during the first 4 months after collection, which may explain why seed pods remain on the tree for 9 months before falling. *Hymenaea courbaril* seeds collected from Puerto Rico average about 253 per kg (Francis 1990), while those from Brazil yield 475 per kg (Pereira 1982). Seeds may be infected by a bruchid beetle [*Pygiopachymerus sp.* (Decelle 1979)], a weevil [*Rhinochenus sp.* (Jansen 1975)], or an ant [*Atta sp.* (Jansen 1983)].

Hymenaea courbaril seeds stored more than 1 year produce acceptable germination percentages. However, storage conditions change with duration. For the first year, seeds should be stored in sealed containers at ambient temperatures (24 to 30 °C). Because humidity becomes excessive within the

container, seeds should be refrigerated or kept in unsealed bags after 1 year of storage (Marrero 1943).

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

Containerized stock may be grown in either full sun or 50-percent shade. However, seedlings grown in full sun are ready for outplanting about 2 weeks earlier than those grown in shade (Pereira 1982, Francis 1990). Although *H. courbaril* may be direct-seeded or underplanted, seeding in containers allows greater protection, promoting greater success. A large tap root with a well-developed fibrous net grows deep and may have associated nitrogen-fixing nodules (Allen and Allen 1981).