

Pterocarpus macrocarpus Kurz

JOHN K. FRANCIS

International Institute of Tropical Forestry,
USDA Forest Service

FABACEAE (BEAN FAMILY)

Lingoum macrocarpum (Kurz) O. Ktze., *Lingoum cambodianum* Pierre, *Lingoum glaucinum* Pierre, *Lingoum gracile* Pierre, *Lingoum oblongum* Pierre, *Lingoum parvifolium* Pierre, *Lingoum pedatum* Pierre, *Pterocarpus cambodianus* Pierre var. *callicolus* Craib

Burma padauk, pradu, terocarpus

Pterocarpus macrocarpus grows naturally throughout the greater part of Burma, northern Thailand, Kampuchea, and into Vietnam (Carrapiett 1960, Hundley 1956, Suvarnasuddi 1950). It is an associate with *Tectona grandis* L.f. in moist to dry deciduous forests.

Pterocarpus macrocarpus is a large tree with a medium growth rate. It develops long and relatively straight boles in closed forest, but as an open-grown tree, tends to have short boles and spreading crowns. In their native range, these trees seldom exceed 30 m in height and 70 cm d.b.h. (Hundley 1956). However, as ornamentals, *P. macrocarpus* trees may reach impressive sizes. A tree approximately 64 years old in Puerto Rico measured 39 m in height and 1.7 m d.b.h. (Francis 1989c). Suitable soils include sandy loams through clays with pH ranging from neutral to very strongly acid. Rainfall throughout the native range varies from about 1000 to 2000 mm per year (Kermode and others 1975). The tree grows from near sea level to 670 m elevation. Mean monthly temperatures are fairly uniform at about 24 °C. (Francis 1989c). Because it grows somewhat more slowly than its fiercely competitive associates, *P. macrocarpus* usually must survive years of suppression as a sapling or pole until disturbance creates a canopy gap through which it can grow. As a result, the species makes up only a small percentage of the canopy trees in its native habitat (Hundley 1956).

Pterocarpus macrocarpus is closely related to *P. indicus* Willd., and it is difficult to distinguish between the two species by leaf and flower morphology alone (Rojo 1977). The fruits of *P. macrocarpus* are usually larger, darker, and have more pronounced central veins than *P. indicus*, but where the native ranges merge and at the extremes of natural seed variation, differentiating between the species is difficult. No hybrids have been reported.

Pterocarpus macrocarpus produces a timber with heartwood that varies from golden brown to brick red. It is comparable in workability to inferior quality teak. Used for furniture, cabinetry, flooring, ship timbers, cart wheels, tool handles, house framing, and posts (Chudnoff 1984, Hundley 1956, Rendle 1970), the wood is very resistant to termites and rot (Carrapiett 1960). A visually pleasing tree, *P. macrocarpus* is planted throughout the moist tropics as an ornamental and shade tree (Rojo 1972). However, older trees have large roots that run along the surface of wet or clayey soil and have a high propensity to damage sidewalks and curbs (Francis and others 1996).

Flowering and fruiting usually begins in open-grown trees between 5 and 10 years of age. The sweet-scented yellow flowers are produced copiously in panicles and racemes. Individual flowers measure about 1.6 cm across. They are pollinated by honey bees and other insects. The fruit of *P. macrocarpus* is a lenticular-shaped pod with a flat wing that circles its edge. These pods have a diameter of 4.5 to 7.5 cm. Large trees may produce one to several quintals of pods annually.

At maturity, the pods dry and turn from greenish yellow to light brown and can be clipped from low-growing trees with pruning poles. Fruits mature about 6 months after flowering and fall off the trees gradually over several months. Because the fruits and their seeds do not deteriorate for several months after falling, they may be collected efficiently from the ground when most of the crop has fallen. The pods are air-dried and stored in plastic bags with or without refrigeration. A sample of air-dried pods of *P. macrocarpus* collected in Puerto Rico yielded 1,067 pods per kg (Francis 1989c) and an average of 2.6 seeds per pod (Francis 1989c). Air-dried seeds in their pods will still germinate after 1 year of storage at room temperature. The pods are tough and the seeds are fragile, making extrac-

tion impossible mechanically and difficult by hand. Shelled seeds average 11,500 per kg (Francis and Rodríguez 1993).

The seeds are usually planted in the pods without any pretreatment. Germination is epigeous. In a comparison study, shelled seeds germinated in 5 days, with 70-percent germination within 2 weeks. Unshelled seeds began germination in 11 days with 64 seedlings per 100 pods germinating within 2 months. In a test in Burma, shelled seeds gave 80- to 90-percent germination. Moreover, seeds from pods that had lain on the ground for 1 year germinated better than new pods collected from the tree (Hundley 1956). The best temperature regime seems to be about 30 °C day and 25 °C night (Liengsiri and Hellum 1988).

Lightly covered with a high-organic potting mix in germination trays or beds, the seeds begin to grow through the

pods about 1 to 2 weeks after planting. The remaining seeds continue to germinate for several weeks. Using seeds in the pods sometimes requires thinning the plants soon after emergence. When true leaves develop, seedlings are transplanted into 1- to 2-L nursery bags filled with potting mixture. After growing under light shade for a few months, the seedlings reach about 0.5 m in height and are ready to outplant (Francis 1989). In Burma, seedlings in plantations grew from 0.6 to 1.2 m the first year and added another 1.2 to 2.1 m in the second (Hundley 1956). In Puerto Rico, 30 planted trees in a small forest plantation that was situated on clay soil over porous limestone averaged 1.3 m in height 14 months after outplanting (Francis 1989c). Seedlings intended for ornamental use are often grown in 12- to 20-L plastic pots until they reach 2 to 3 m in height before outplanting.

