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Enterolobium cyclocarpum

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Published in:
Seed Leaflet

Publication date:
2003

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Jøker, D. (2003). Enterolobium cyclocarpum. *Seed Leaflet*, (77).

Download date: 13. Nov. 2026

SEED LEAFLET

No. 77 June 2003

Enterolobium cyclocarpum (Jacq.) Griseb.

Taxonomy and nomenclature

Family: Fabaceae (Mimosoideae)

Synonyms: *Albizia longipes* Britton & Killip, *Inga cyclocarpa* (Jacq.) Willd., *Mimosa cyclocarpa* Jacq., *Mimosa parota* Sessé & Mocino, *Pithecellobium cyclocarpum* Mart.

Vernacular/common names: ear pod tree, elephant ear, monkey-soap (Eng.); guanacaste (negro), genicero (Sp.); sengon buto (Indonesia); Mexican walnut (trade name).

Distribution and habitat

The area of natural distribution is from central Mexico, south through Central America to the northernmost part of Brazil. In its native range it is a conspicuous and well-known tree; it has been adopted as the national tree in Costa Rica and the province of Guanacaste is named after it. It occurs in a wide range of tropical forest types. In dry deciduous forest it is a climax tree while in moist forest it is restricted to disturbed areas. It is a lowland species that is rarely found above 1000 m altitude and it does not tolerate frost. Through most of its range there is annual rainfall of 750-2000 mm and a dry season of up to six months duration. It tolerates a wide range of soil types but not waterlogging. Within the native range it is typically found scattered in pastures where it occurred naturally and were left when the forest was cleared. Although it has been introduced throughout the tropics it is little planted outside of its natural range except as a roadside or garden tree.

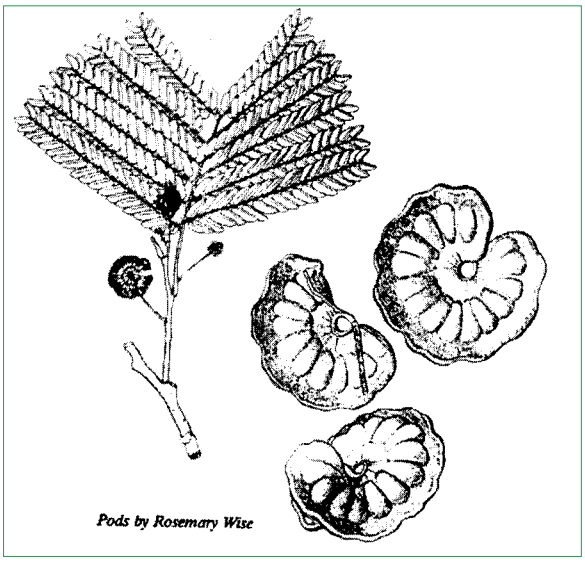
Uses

The species is mainly used as a pasture tree in silvopastoral systems. The pods are used for fodder; they are highly palatable and large quantities are produced over a period of two months at the end of the dry season when other food sources are scarce. Also the leaves are palatable but less so than the pods. The wide spreading crown provides excellent shade for livestock as well as for crops such as coffee.

The wood is of medium quality with specific gravity ranging from 0.4 to 0.6. The heartwood is brown with various shadings and is resistant to fungi and termites. It is easy to work but the dust from sawmilling can cause allergies. It is used in house construction and for indoor elements such as panelling. The ability to fix nitrogen, and to resprout vigorously after coppicing or lopping suggests that it could have a role in alley-cropping systems but this is an area that requires further research.

Botanical description

Very large tree, up to 40 m tall and a diameter up to 3 m. The bole is short, often with small buttresses, and the crown is huge and spreading. Bark is pale grey-brown, inner bark light brown, bitter and astringant and exudes a brown latex. Leaves are compound with numerous, 8-15 mm long leaflets. The small white flowers are arranged in compact round heads 1-1.5 cm in diameter.



Flowering branch and pods. From: Hughes and Steward (1990).

Fruit and seed description

Fruit: the fruit is a thick, indehiscent pod that is contorted to almost form a circle 8-10 cm in diameter. In shape it resembles an ear, which many of its commons names refer to. At the time of maturity the pods are shiny dark brown. Inside the pod the seeds are arranged in rows, embedded in the sweet pulp. The pods contain 10-15, sometimes up to 20, seeds. The seed chambers are clearly visible on the outside of the pod, a feature that distinguishes *E. cyclocarpum* from other species of *Enterolobium*.

Seed: the seeds are 15-20 mm long, flat, dark or reddish-brown and with a yellow, oval pleurogram on each side. There are 900-1400 seeds per kg.

Flowering and fruiting habit

The trees are generally deciduous, shedding their leaves during the dry season and stay bare for 1-3 months. About two months before the beginning of the rainy season new leaves are set and at the same time the flowers appear. The fruits take a year to mature and the seeds mature at the same time as the trees flower. The pods do not open but are shed with the seeds inside. Within its native range flowering occurs in March-April and fruits fall in April-May. A tree may bear several million flowers. The flowers last only 24 hours and they are thought to be pollinated mainly by night-flying insects such as moths and beetles. Seed production does not start until the trees are 15-25 years old. The seeds are dispersed by grazing animals that feed on the fruit pulp.

Harvest

Ripe, dark brown pods are best collected from the ground after natural fruit fall. Normally fruits are produced every year. One tree can produce about 2000 fruits.

Processing and handling

After collection the fruits are transported in hessian bags to the processing site where they are spread out on the ground or on a tarpaulin to dry in the sun for one or two days, 3-4 hours per day. When dry, the pods are pounded with sticks or threshed in a machine to open, followed by winnowing and screening to extract the clean seeds.

Storage and viability

The seeds are orthodox and if stored at less than 10% moisture content in hermetically sealed containers they will stay viable for several years. If the seeds are stored at 5°C they can retain about 80% germination for more than 10 years.

Dormancy and pretreatment

The seed coat is extremely thick and hard and the seeds will not germinate unless they are scarified to allow water to enter into the seed. For small seedlots it is recommended to cut of a small part of the seed coat at the end away from the micropyle (scar). For larger amounts a suitable method is to soak the seeds for 30 seconds in water that is close to the boiling point followed by soaking for 24 hours in water at room temperature.

Sowing and germination

Seed should be sown at a depth of 1-2 cm with the micropyle (scar) pointing downwards otherwise the root may grow upwards and out of the soil. Germination is fast, it starts after about four days and is normally complete after 10 days. Germination is good, about 85%. The seedlings require little shade in the nursery. They are ready for planting in the field after six months. Early growth of the seedlings is exectionally rapid and vigorous and this continues several months after outplanting but then growth rate, although still vigorous, falls to a level similar to other fast-growing species. The species is light-demanding at all stages in its development and it is susceptible to weed competition during early growth.

Natural regeneration is not seen in forests, maybe because the fruits were once eaten and dispersed by large herbivores that are now extinct. In open fields where there are livestock around it regenerates successfully but the seedlings are grazed by cattle.

Seed supplies are currently dependent on collections from natural populations in Latin America and scattered cultivated trees in areas where it has been introduced. Most early introductions were undocumented, casual and collected from a narrow genetic base. A broader range of representative germplasm should be tested to evaluate the potential of the species. Seed is available from Oxford Forestry Institute for the establishment of field trials.

Seed of *E. cyclocarpum*. Grid has 1 cm divisions. Photo by Dorthe Jøker, DFSC

Selected readings

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