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Calliandra calothyrsus Meissner

Taxonomy and nomenclature

Family: Fabaceae (Mimosoidae)
Synonyms: *Anneslia acapulcensis* Britton & Rose, *A. calothyrsus* (Meisn.) Donn.-Sm., *A. confusa* (Sprague & Riley) Britton & Rose, *A. similis* (Sprague & L. Riley) Britton & Rose, *Calliandra acapulcensis* (Britton & Rose) Standl., *C. confusa* Sprague & L. Riley, *C. similis* Spraue & Riley, *Feuillea calothyrsa* Kuntze.
Vernacular/common names: cabello de ángel, pelo de ángel (Sp.); calliandra, red calliandra (Eng.); kalliandra merah (Indonesia).

Distribution and habitat

Native to Central America from the western Pacific coast of Mexico to central Panama. It occurs in both primary and disturbed forest at altitudes between 0-1850 m in areas with 700-4000 mm rain/year. It can grow on a range of soils but is especially tolerant to acidic soils. It is not tolerant to frost and requires a mean annual temperature of 22-28°C.

Uses

The fast growth and tolerance to acidic soils where other tree species perform poorly has made it a popular species in small-scale agroforestry throughout the humid tropics. It is nitrogen-fixing and improves soil structure and fertility. It is used as an understorey component on coconut plantations, a shade tree in coffee and tea plantations and a nurse tree in timber plantations.

The ability to resprout after repeated cutting makes it valued for fodder production, especially in areas where the use of other multipurpose trees is limited by environmental and disease contraints. For example, it can replace *Leucaena leucocephala* in areas where growing *Leucaena* is prevented by psyllids. The leaves, flowers and twigs are edible and contain 20-25% crude protein and although the nutritive value is less that e.g. that of *Leucaena* it is a good supplement to the diet of most animals.

It is also widely used as fuelwood by small-scale farmers as well as grown in large plantations. In Indonesia it has been successfully used to rehabilitate *Imperata* grasslands. It is an important source of forage for honey-bees and the trees are a suitable host for the insects that secrete shellac, a compound used for lacquers and dyes.

Botanical description

Small tree or shrub with either one or more stems, up to 12 m tall and 20 cm in diameter. The leaves are compound, up to 20 cm long and divided into many small leaflets. At night the leaves fold against the stem. Flowers in up to 17 cm long, upright inflorescences that are placed just under the end of branches. The flowers have small, green petals and sepals and 5.5-6.5 cm long anthers that are white at the base and bright red at the ends.

1. Flowering branch, 2. peduncle with pods. Copyright: PROSEA Foundation

Fruit and seed description

Fruit: the fruit is a pod, up to 18 cm long, pale to dark brown and normally without hairs. There are 8-12 seeds per pod.
Seed: seeds are flat, oval, up to 8 mm in diameter and with irregular dark spots on the surface. There are 14.000-20.000 seeds per kg.

Flowering and fruiting habit

The flowering season varies throughout the natural range and where there is sufficient moisture available, flowering can extend throughout the whole year. However, a period of peak flowering normally occurs after the main wet season but before the onset of the dry season. This is observed both within and outside of its natural range indicating that it is mainly rainfall that initiates flower production. In Central America peak flowering occurs between October and January.

The flowers mature over several months, beginning with the flowers at the base of the inflorescence. They open for one night only, by the next day the anthers wilt and unfertilized flowers drop. Nectar-feeding, and to a lesser extent fruit-eating, bats are the main pollinators. Many insects also feed on the nectar but without pollinating the flowers. The species is predominantely outcrossing but the degree of tolerance to selfing varies between provenances.

C. calothyrsus flowers abundantly but relatively few seeds are produced and especially outside the area of natural distribution poor seed production is a major limitation to its use. Irrigation and fertilisation have been reported to improve seed production.When the pods split open the seeds are forcefully ejected and dispersed up to 10 m from the mother tree.

Harvest

When the pods become dark-brown the seeds inside are mature. Only ripe pods and their mature seeds should be collected. The pods are picked from the tree just before they open and the seeds are dispersed. Alternatively, hessian bags or nets can be placed on the ground under the trees. When the pods are ripe they open and the seeds will drop onto the ground where they are swept up at daily intervals. This method is mainly used in seed production areas where there are no other species present. It is less time-consuming and it ensures that only mature seeds are collected but may be difficult to use if the trees are grown in farmland or in dense vegetation. At the time of collection the mature seeds have a moisture content of 12-15%.

Processing and handling

If pods are collected, they are left in the sun to dry until they open. It is best to leave the pods to open slowly and not use force to open them. Inside the pods the seeds dry at a slow rate and too rapid drying can kill the seeds. Once the pods are open the seeds are cleaned manually or in a seed cleaner.

After extraction the seeds are dried in the sun to 6-10% moisture content. In very hot climates the seeds should not be exposed to direct sunlight for long periods of time. In wet conditions the seeds can be placed in net bags and dried in the hot streams of air over a stove. The bags must be at a safe distance from the heat source.

Storage and viability

The seeds are orthodox and should be stored at moisture content below 10% in air-tight containers. At room temperature (25°C) the seeds will retain high viability for about 12 months. If the seed needs to be stored for longer time, cold store is necessary. At 4°C the seed can be expected to retain 70-90% viability for up to five years.

Dormancy and pretreatment

Fresh seeds can germinate without any pretreatment. Dry seeds, e.g. seeds that have been stored, have a hard seedcoat and scarification improves germination significantly. Submerging the seeds in 70-80°C water and then leaving the seeds to cool in the water is the most common method and will normally give the best germination. However, in some instances hot water can kill the seeds and it is recommended to test the technique before using it on the entire seedlot. If for a given seedlot hot water turns out to be damaging, soaking in cold water for 24 hours is recommended.

For containerised stock, two seeds are sown at a depth equal to their length in a 10 x 20 cm container. Surplus seedlings are removed when the first adult leaves have developed. Germination is fast, it is normally completed in 4-10 days. After 6-12 weeks when the seedlings are 15-50 cm tall they are ready for planting in the field. For the production of bare root seedlings the plants need at least 2-5 months in the nursery. The seeds can also be sown directly in the field in the beginning of the wet season. Low cost vegetative propagation using leafy stem cuttings has been described by Dick *et al.* (1996).

Shade trees: tea plantations in Sri Lanka. Copyright: Alan Pottinger

Selected readings

Chamberlain, J.R. 2000. *Improving Seed Production in Calliandra calothyrsus. A Field Manual for Researchers and Extension Workers*. Oxford Forestry Institute.

Chamberlain, J.R. (ed.) 2000. *Calliandra calothyrsus – An agroforestry tree for the humid tropics.* Tropical Forestry Papers no. 40. Oxford Forestry Institute.

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