



Calliandra calothyrsus Meissn.

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Leguminosaeae

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[Photo](#)

Synonym

- *Calliandra confusa* Sprague & Riley (1923)

Common names

Calliandra (En).

Origin and geographic distribution

Native from northwestern Panama to southern Mexico, between 8°-16° N. Introduced in Indonesia in 1936 and later to many other tropical countries, particularly in South-East Asia.

Description

Shrub or small tree, (1.5-) 4-6(-12) m tall, with trunk diameter up to 30 cm, blackish-brown bark and a dense canopy. Leaves bipinnate, alternate, rachis 10-17 cm long, without glands, pinnae 4-7 cm long in 15-20 pairs with 25-60 pairs of dark green leaflets each; leaflets linear, 5-8 mm x 1 mm. Evergreen in humid environments, but deciduous during prolonged dry periods. Inflorescences composed of few to many flowered heads, in terminal raceme-like clusters of 10-30 cm length. Flower showy, purplish-red, 4-6 cm long; calyx 2 mm long; corolla 5-6 mm long, pale green; stamens numerous, 4-6 cm long, purplish-red. Fruit broadly linear, flattened, 8-11 cm x 1 cm, slightly tapering from top to base, margins thickened and raised, finely pubescent or glabrous, brownish, dehiscent, 3-15-seeded. Seed ellipsoidal, flattened 5-7 mm long, dark brown (Wiersum and Rika, 1992). There is a high level of genetic diversity within calliandra (Chamberlain 1998). Provenances from different areas within its natural range of distribution vary greatly in condensed tannin contents and structure (Stewart *et al.* 2000).

Use

The leaves and twigs are used as a high quality protein supplement to cattle and goats feeding on low quality forages and crop residues. Calliandra leaf meal is also used as supplement for poultry (Paterson *et al.* 2000). Calliandra forage is usually cut by hand to a height of about 1 m and fed to tethered or stabled animals. It is usually fed fresh as problems of diminishing digestibility and intake, as a result of wilting or drying, have been reported. This problem appears not to occur when calliandra is used as a supplement. Other uses are for fuelwood, pulp for paper production, erosion control, smothering weeds, firebreaks, ornamental and as green manure in rotation with arable crops. It is also used in alley-cropping systems, as a nurse tree for partially shade-tolerant timber trees and as an effective understorey in coconut plantations with about 60% light transmission (Wiersum and Rika 1992).

Properties

Calliandra leaves contain (DM basis): N 3-4%, fibre 30-75%, ash 4-5% and fat 2-3% (Wiersum and Rika 1992). High concentrations of condensed tannins (up to 20%, Jackson *et al.* 1996 and higher, personal communication J.L. Stewart) that bind onto different compounds for different provenances of calliandra can have a big impact on digestibility of dried material. Conflicting results have been published by various authors on the effects of drying at varying temperatures on digestibility and intake of calliandra. Mahyuddin *et al.* (1988) reported that *in sacco* digestibility of fresh material was around 60%, whilst that of sun-dried material was only 35-42%. Palmer and Schlink (1992), feeding calliandra as the sole feed, found that intake of fresh calliandra by sheep was 59 g dry matter/kg $W^{0.75}$, whilst that of oven dried material (24 hrs at 25 °C) was only 37 g dry matter/kg $W^{0.75}$. Norton and Ahn (1997), feeding calliandra as a supplement, reported that intake was unaffected by drying and the intake of the basal diet was significantly higher when supplemented with dried calliandra. Recent research by Palmer *et al.* (2000), using laboratory drying found that temperature of aerobic drying above 45 °C had a major effect on *in vitro* dry matter digestibility (IVDMD). Anaerobic drying, however, did not change IVDMD with increasing temperature. Stewart *et al.* (2000) showed that provenance of calliandra had a major effect on condensed tannin content and structure, crude protein and fibre contents. However, they also found that drying did not reduce *in vitro* digestibility of calliandra leaf, whilst in one provenance it actually increased it significantly. This is in contrast to the results of Mahyuddin *et al.* (1988) and Palmer and Schlink (1992). J. L. Stewart (personal communication) stated that the contradictory results might be related to methodological differences.

Calliandra has a lower forage production and lower feeding value than leucaena (*Leucaena leucocephala*), but it has the distinct advantage that it grows well on acid soils on which leucaena does not thrive. Leucaena also suffers from psyllid (*Heteropsylla cubana*) attack, whereas adult psyllids are unable to feed or oviposit on calliandra (Vandeschricke *et al.* 1992)

Toxicity

None. However, there are conflicting reports whether the high concentrations of condensed tannins may be responsible for reduced palatability and digestibility of wilted or dried material of certain provenances of calliandra. However it appears that feeding as a supplement instead of a sole feed will avoid these problems.

Ecology

Calliandra grows in warm climates (20 -28°C) at altitudes up to 1500 m above sea level with an average annual precipitation of 700 mm to 4000 mm and a dry season of 1-7 months. Calliandra is quite shade, but not frost tolerant. It is an aggressive colonizer on disturbed sites such as recent landslides and roadsides (Wiersum and Rika 1992, Shelton *et al.* 1996, Evans 1996).

Soil requirements

Calliandra grows on all soil types and is well adapted to acid soils of poor fertility, but can respond to fertilizer application on such soils. It prefers light soil textures of volcanic origin. It does not tolerate waterlogging.

Propagation and planting

Calliandra does not take well from stakes and is therefore generally sown directly in the field or in the nursery. Seeds germinate without pre-treatment, but germination can be improved by brief immersion in almost boiling water and soaking for a further 24 hours. Seeds retain their viability for at least 2-3 years in a refrigerator, but it decreases within one year at room temperature. Nursery plants are transplanted when they are 20-50 cm tall and have a root collar of 0.5-1 cm. Areas to be planted must be cleared completely. Calliandra can be used as a protein bank in a planting density of up to 40000 trees/ha, or grown on fence lines (Wiersum and Rika 1992, Palmer *et al.* 1994).

Rhizobial requirements

Calliandra is moderately specific with regard to rhizobial requirements, but it was shown that inoculation is not necessary in the field (Shelton *et al.* 1996).

Growth and development

Its early growth is slow, but once mycorrhizal infections have become effective it grows vigorously up to a height of 3.5 m in 6 months. Flowering may start in the first year, but good fruit setting normally does not occur until the second year. Large quantities of seed are produced. In Indonesia, calliandra flowers and fruits throughout the year, but most seeds are produced in the dry season. Flowers are insect-pollinated and seeds mature 2 months after pollination. The stem turns brittle around the age of 12 years, but the rootstock remains vigorous and new sprouts are easily formed. After cutting, trees coppice vigorously. With annual coppicing of stems of 3-5 cm in diameter, plants can survive for many years. Roots develop quickly and may reach 1.5-2 m in plants of 4-5 months old. Both surface and deeply penetrating roots are formed. In humid climates the tree is evergreen, in areas with a long dry season it is semi-deciduous. In severe dry conditions, trees die back but recover at the beginning of the rainy season (Wiersum and Rika 1992).

Diseases and pests

In the Philippines trees are damaged by a stem-borer and in Kenya, damage from a rose flower beetle (*Pachnoda ephippiata*) has restricted seed production, but from Indonesia no serious diseases or pests have been reported.

Performance

Forage DM yields range from 7-10 t/ha per year (Panjaitan *et al.* 1993), although yields will be lower in areas of low rainfall or infertile soil. In field trials in north Sumatra, sheep fed a supplement of 5% body weight of calliandra had an average daily liveweight gain of 33.4 g/d compared to 15.3 for leucaena, 33.9 for *Gliricidia sepium* or 57.1 for *Albizia falcataria*. Local ewes grazing native pasture and offered 5 shrub legumes showed greatest preference for *Leucaena* spp. followed by *A. falcataria*, calliandra and *G. sepium*. Intake of *L. leucocephala* cv. Cunningham, calliandra and *G. sepium* fed as a sole forage was 2.74, 1.61 and 1.67% of body weight (Ibrahim *et al.* 1988). On-farm experiments in Kenya have shown that 3 kg of

fresh calliandra (1 kg dry matter) as a supplement can replace 1 kg of dairy meal without affecting milk yield. An additional 3 kg of fresh calliandra increased milk yield by 0.6 kg (Paterson *et al.* 1999).

Acknowledgement

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Links

- [Calliandra calothyrsus - a multipurpose tree legume for humid locations](#): description, uses and references
- [Diversity within tropical tree and shrub legumes: Calliandra calothyrsus](#)
- [Ecology & Evolutionary Biology Conservatory](#): general information on *C. calothyrsus* Meissn.
- [Crop and plant index of the Purdue University](#): uses, description, distribution and references list on *C. calothyrsus*
- [Link to AFRIS](#)

References

[Chamberlain J.R. \(1998\)](#); [Evans D. O. \(1996\)](#); [Ibrahim T. M. et al. \(1988\)](#); [Jackson F. S.et al. \(1996\)](#) [Mahyuddin P.et al. \(1988\)](#); [Norton B.W. and Ahn J.H. \(1997\)](#); [Palmer, B. and Schlink, A.C. \(1992\)](#); [Palmer B.et al. \(2000\)](#); [Palmer B. et al. \(1994\)](#); [Panjaitan M. et al. \(1993\)](#); [Paterson R.T. et al. \(1999\)](#); [Paterson, R.T. et al. \(2000\)](#); [Shelton H.M. et al. \(1996\)](#); [Stewart J.L. et al. \(2000\)](#); [Vandeschricke F.et al. \(1992\)](#); [Wiersum K.F. and Rika I.K. \(1992\)](#)