Leucaena

(An extremely valuable browse shrub legume for cattle in the Top End)

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DESCRIPTION

Leucaena (*Leucaena leucocephala* subsp. *glabrata* cultivars *Peru*, *Cunningham*, *El Salvadore*, *Wondergraze* and *Taramba)*, is a deep-rooted, drought-tolerant, leguminous shrub/tree that is planted for grazing or cut fodder in the subtropics and tropics. It has the highest nutritive value of all tropical forages. Cultivars *Peru* and *El Salvadore* became available in Australia in 1962 after intensive breeding and selection. *Cunningham* was released later in 1976 and *Taramba* more recently, in 1994 and *Wondergraze* in 2009. Other releases are available that are specific for different sites.

Figure 1. Established rows of leucaena in grass pasture

The stems are from 6 mm to 400 mm in diameter and up to 10 m tall. If allowed to grow, the tree can provide both shade and grazing; alternatively, it can be grazed when young, as a shrub. Leaves are large, feathery (bipinnate) and 15-20 cm long. Each pinna is 100 mm long, with leaflets in pairs of 11 to 17, smooth, hairless and dark green. Flowers are white to yellow, round ball-like, and are produced from the leaf axil. Seed pods are flat, green to dark brown (depending on maturity), up to 20 cm long and contain up to 20 seeds, which are flattened, ovate, shiny dark, chocolate brown and up to 6-7 mm long.

The seeds exhibit high levels of hardness and remain viable for a long period of time. There are about 24 000 seeds/kg.

CLIMATE AND SOILS

Leucaena is a native of Central and South America and the Pacific Islands, but is wide-spread throughout the tropics and subtropics. It favours well-drained fertile soils with a wide range in pH. However, it prefers alkaline soils. It mainly requires soils with a good water-holding capacity through the dry season; otherwise high quality protein feed in the dry is lost due to leaf fall.

The Blain and Tippera soils of the Douglas Daly and Katherine regions appear most suitable for growth and production of leucaena. There have been some attempts to grow *Cunningham* leucaena on gravelly laterite soils further north, closer to the coast. However, in those areas severe leaf fall occurs during the early dry season, within four to six weeks of the last of the wet season rains. Supplementary irrigation would be needed during the dry season on those soils. Cultivating leucaena in the deeper red earth soils in this area may prove to be more successful. Annual

NORTHERN TERRITORY GOVERNMENT

rainfall preferably over 600 mm is required, with frost-free conditions and mean temperatures above 10°C in the cooler months.

ESTABLISHMENT

Seed can be planted in single or double rows (30–80 cm apart) and 25 to 35 plants/m, so that individual plant size is restricted. No-till planting is recommended when introducing into established grass areas to reduce the likelihood of competition. Deep ripping along the row may be required to assist in plant establishment and good root development. Row spacings can be between 8-12 m apart depending on grazing management and location. Closer row spacing needs to be monitored and the plants need to be pruned to reduce shading of the grass in the inter-row. This can be achieved by careful grazing or by any other means available, including orchard trimmers, slashers (can damage if cut too low) or by heavy (crash) grazing at strategic intervals. Be careful to allow enough space for machinery between the rows for weed control, fertilising and mustering.

Figure 2. Flowers of leucaena

Seed should be sown at a rate of 0.2-0.4 kg/100 m through a single row planter (or double row planter) at a depth of no more than 20-30 mm. Best germination is achieved by scarifying the seed prior to planting, if the proportion of hard seed is high. Already scarified seed can generally be purchased. Seed should be inoculated with the specific leucaena rhizobia (strain CB3060) before planting.

A starter fertiliser should be banded to the side of the seed and not mixed with the seed due to the deleterious effect on the rhizobium inoculation.

MANAGEMENT

Varieties

The current varieties are *Cunningham*, *Taramba and Wondergraze* with *Peru* an older variety. There are few differences in growth patterns between the three varieties, except that the latest releases, *Taramba and Wondergraze*, appears to hold its leaf a bit better into the dry season and produces much fewer flowers and seed pods, can be better forage yielding and psyllid tolerance.

Fertiliser Requirements

Figure 3. Unripened seed pods of leucaena

The main requirements are for phosphorus (P) and sulphur (S) (super phosphate or similar) at around 20 g/m of row at establishment. From then on, the paddock should be fertilised annually at the rate of 100 kg/ha of super (or equivalent amount of P and S in a different formulation). After seedlings grow to about 100-200 mm tall, a side dressing of nitrogen (N), P, and potassium (K), plus trace elements fertiliser can be applied almost monthly at the rate of 20-30 g/m of row per application along the row to speed up the establishment process in the first season. At least one application is advisable. Later applications would depend on the desired response. Fertiliser application increases growth rate in the first year, which is critical for long-term survival and production. Leucaena should preferably be planted during December in the first monsoon burst to get maximum growing time in the first year. As leucaena is slow to fix its own N, a starter N boost is beneficial during the first three months of growth. P requirements will depend on the individual soil types.

Mixtures

Any grass recommended in the district can be planted in the inter-row spaces. In the Douglas-Daly area, pangola, buffel, sabi, Jarra, and Strickland would all be suitable companion grasses.

Leucaena can be added to an existing grass pasture by spraying a 1.5-2.0 m strip with Glyphosate herbicide and sowing leucaena seed into the centre of each strip. After planting, the row can be sprayed with Spinnaker 700 WDG® at the rate of 140 g/ha along the row to control pre-emergent grass and certain broad- leaf weeds. It is recommended that only clean, weed-free paddocks be used to plant leucaena as broad-leaf weeds, particularly *Sida* spp., *Senna* and *Hyptis*, may establish in the rows and become hard to control. This is because the herbicides for the control of these weed species also damage leucaena.

Nutrient Concentrations

Ranges of 2.4% to 4.8% of N in leaf samples have been recorded from monthly sampling. This equates to a crude protein content of 15% in September, to 30% in November-December. Ranges of 0.09% to 0.24% of P have been recorded in leaf samples.

Grazing

Grazing is not recommended in the first year in order to achieve maximum growth during the first wet season. Leucaena trees should be 1-1.5 m in height before the first grazing. To allow full recovery, stock should be removed well before total defoliation. A system that has worked well at the Douglas Daly Research Farm (DDRF) involves locking up one half of a paddock for a month while grazing the other half, then moving stock to the saved half in the following month. Stocking rates are still being assessed but 1.25 yearlings/ha on fertilised paddocks is a very conservative minimum rate at this stage. Rates of 1.5 yearlings/ha have also proved to be sustainable.

Restrictions on Feeding

Leucaena should not be fed to horses or pigs as hair loss may occur. It should not be fed to sheep as the wool may be affected. For goats and cattle, it is fine to use leucaena for up to 30% of the diet. If fed above that level, appetite

may be affected unless the herd is treated with the "leucaena bug". This rumen micro organism was introduced from Hawaii by the CSIRO in the 1980s to detoxify the mimosine (DHP) contained in the plant, once in the rumen. The rumen bug is cultivated by QPI&F and can be ordered in 500 mL flasks from the Brian Pastures Research Station, Gayndah. The fluid can be drenched through the mouth, or injected directly into the rumen. The bug is easily transmitted between animals but to maintain it in the herd, there should be some overlap between groups of animals to enable its transfer when new animals are introduced. Therefore a few animals will need to be kept back to overlap with new animals to allow for the transmission of the rumen bug.

Productivity

At DDRF in the Douglas Daly area, cattle on grass/leucaena pasture plots have gained 190-240 kg/head/year at stocking rates of 1.25 yearlings/ha, depending on seasons, when fed supplement blocks throughout the year. This is about 30-40 kg/head higher than in animals raised in pure grass paddocks.

Fire

A hot fire can significantly reduce the number leucaena plants, which may require replanting. However, although some burnt trees may appear dead, there is often some re-shooting from the base (crown) of the plants during the next wet season. Fire exclusion strategies are highly recommended.

PESTS AND DISEASES

The main problem in leucaena is early grazing by wallabies, pigs or cattle. Controlling this problem is vital for successful establishment.

Soil insects such as termites and hoppers may be a problem to emerging seedlings.

The other notable pest is the leucaena psyllid, (*Heteropsylla cubana*) which caused considerable damage in leucaena world-wide, particularly in humid areas, during the 1980s and 1990s. In the NT, the effects of this pest are noticeable only during the mid to late wet season and the start of the dry season when the leaves appear a bit dry, off-colour and marked (spotty). The symptoms tend to disappear as the dry season progresses, without causing a great deal of visible damage. Growth depression is probably caused during this period of infection. The psyllid is visible to the naked eye and can be found, if present, by shaking a frond onto a dark piece of paper. The psyllids are around 0.5-1 mm long and are cream to whitish in colour.

WARNING

Pasture plants in general may have the potential to become weeds in certain non-grazed situations. To prevent this, ensure that pasture seeds and/or vegetative material are not inadvertently transferred to adjacent properties or road sides.

There are differences between the weed 'coffee bush' and cultivated pasture leucaena. Coffee bush is a different subspecies called *Leucaena leucocephala* ssp. *leucocephala* and should not be confused with forage *Leucaena leucocephala* ssp. *glabrata*. Because of possible weediness issues, (which are considered low in the Top End), the low-seeding cultivar *Taramba* is the recommended choice in sensitive areas.

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