# New Caledonia range reforestation with leguminous trees and shrubs*

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## Abstract

The psyllid has affected New Caledonia with significant feed shortage linked with the *Leucaena leucocephala* decreasing. This fodder tree was the most valuable component to beef and deer producers during the dry season, offering high feeding value during this difficult period. Among intended solutions to overcome its loss in the most degraded areas, research has been carried out on other promising tree species such as *Acacia ampliceps, Calliandra calothyrsus* and *Gliricidia sepium*. Experiments were conducted about varieties, provenances and establishment techniques (plastic nursery bags, stumps, direct sowing, inoculants). Also trials about various management techniques and animal uses have been established. Investigations were also carried out about landscape management with fodder trees in an integrated development on a deer breeding farm seriously damaged by soil erosion.

## Introduction

*Leucaena leucocephala* occurred in abundance throughout the west coast of New-Caledonia. Cultivated since 1855, this species spread readily over all this area since the beginning of the century. This fodder tree has played an important role in providing animal feed of high nutritive value during the dry season. Unfortunately, due to a psyllid problem the occurrence of *L. leucocephala* has decreased strongly, and in spite of biological control measures to decrease the psyllid infestation it has become necessary to use shrub legumes which are resistant to the psyllid.

## Fodder shrub experiments

Since 1988, studies have been conducted in New-Caledonia by CIRAD on other potentially useful fodder tree and shrub species. The first trial was carried out in the driest location in Bouloupari. Among several species, 3 have grown well: *Acacia guechepele, ampliceps* and *Gliricidia sepium*. But *A. guechepele* produces more branches than leaves. Another trial was conducted in 1992 close to Noumea with 7 species: *A. ampliceps, Albizia lebbeck, Calliandra calothyrsus, G. sepium, Hibiscus tiliaceus, Pterocarpus indicus, Samanea saman*. In spite of low rainfall, 4 species thrived: *A. ampliceps, G. sepium, H. tiliaceus* and *C. calothyrsus*.

The biomass production registered after 2 years for *C. calothyrsus:* was leaf biomass 2.5 t $ha^{-1}$, branches biomass 2.4 t $ha^{-1}$. With *Gliricidia* it was only 1.5 t $ha^{-1}$ (leaves) and 1.0 t $ha^{-1}$ (branches).

In 1994, a trial was established in the same place to compare the production and palatability of 4 fodder trees. In this comparison trial the height of *C. calothyrsus, A. ampliceps, G. sepium and S. saman* were observed to be 2.7, 2.1, 1.6, 1.0 m in Port-Laguerre after one year.

After these first experiments it seemed obvious that *C. calothyrsus* on the wet zone and *A. ampliceps* on the dry areas could be used as substitutes for *Leucaena*. Experiments were also carried out using several provenances of these 2 species to test the performance, and if possible, the palatability of different provenances.

The two experiment with *A. ampliceps* were carried out since 1994, one in Mare Island, and the other in Païta near Noumea; 5 provenances from CSIRO were planted with the provenace 18 425 (Mataranka) the mean height was 82 cm (79 cm with YG2 *Rhizobium* strain) after 8 months, and 166 cm (159 cm with YG2) after 15 months. The worst result was observed with the provenance 15 755 (30 km S. Broome) 83cm (70cm with YG2) after 8 months and 130cm (121cm with YG2).

An experiment plot was conducted with *C. calothyrsus* in Mare Island in 1995 with 13 provenances from the Oxford Forestry Institute. At the same time an experiment was carried out to test the effects of planting density on a CIRAD deer farm with *C. calothyrsus*. The first results showed that with a density of 1 × 1 m the highest biomass was observed. But under cattle grazing, biomass production was better at 2 × 0.5 m.

Investigations were also conducted into landscape management using fodder trees in an integrated development project on a deer farm that had been seriously damaged by overgrazing and soil erosion after several dry years. Erosion and runoff were investigated on an experimental watershed with 6 erosion plots. First the area was protected from wild goats and deer grazing. On flat areas, from 5 to 10%, contour grass cultivation increased production. On moderate slopes up to 25%, level and bench terraces are sown with grass and shrub seeds and seedlings of thorny shrubs were planted (to resist deer grazing).

Now we are working to establish *C. calothyrsus* by direct seedling. The biggest problems are the slow growth of seedlings and competition from weeds. After weedicide treatment, this species gave better results (survival and growth rate) than *L. leucocephalla* cv. *cunninghamii* or *G. sepium*.

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## References

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