

Growth of Tree Legumes under Coconuts in North Sulawesi

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Abstract

Thirteen introduced and local tree legumes were evaluated for growth and yield under coconuts with a light transmission of 70% in the wet tropical environment of North Sulawesi. The introduced accession of *Calliandra* sp. produced by far the highest leaf yields, but *Flemingia macrophylla*, *Gliricidia sepium*, *Calliandra calothyrsus* (local), *Desmodium rensonii* and *Codariocalyx gyroides* also showed potential.

IN North Sulawesi, leguminous shrubs and trees such as *Gliricidia sepium* and a local variety of *Erythrina* sp. are commonly used as fences and as live stakes under coconuts to provide shade for climbers such as vanilla. These species also provide high quality forage which could be used as a supplement to the low quality naturally occurring grasses. At present there is little information on the adaptation and productivity of the range of tree legume germplasm available for growing under coconuts in North Sulawesi.

This paper reports the results of an evaluation of the growth and yield of a selection of introduced and local tree legume species growing under a coconut plantation.

Materials and Methods

This experiment was conducted at Kayawatu (Lat. 1°30' N) near Manado Airport in North Sulawesi. The total annual rainfall of 2700 mm is relatively evenly distributed except for a period of lower rainfall (100-150 mm per month) from July to September. The soil was a sandy loam with a pH of 6.0. With the exception of phosphorus, the fertility of the soil was high. Transmission of photosynthetically active radiation (PAR) at the site under mature tall coconuts averaged 70% at 10 a.m. on a sunny day.

There were nine introduced (seed supplied by Mr Ron Williams, Australian Tropical Forages Genetic Resource Centre) and four local species included in this trial (Table 1). The introduced species were inoculated with known suitable *Rhizobium* strains and all plants were raised in a nursery before being

transplanted into the field in August 1988. The local species were planted vegetatively using 30 cm long stakes. Nine plants of each species were planted into separate plots in two rows of 1 x 1 m.

The plants were rated for plant survival, disease and insect incidence, flowering and seed production, initially monthly and later before each harvest. The first harvest was taken four months after planting and subsequently every two months for a total of nine harvests (December 1988 to June 1990).

The main stem and all branches were cut at a height of 1 m. The cut material was weighed fresh in the field and then separated into leaf, stem and inflorescence. Samples were sun-dried before oven-drying at 70°C.

Results and Discussion

Many of the *Flemingia macrophylla* seedlings did not survive transplanting and only two of the original nine plants survived to the first harvest. The seedlings grew poorly and a disease problem was suspected. The surviving two plants grew well and no further disease symptoms were observed. Similarly, only two of the nine vegetatively propagated *Sesbania grandiflora* plants survived to the first harvest. The yield of these two species is therefore based on only two plants and has to be considered with caution.

Survival of the established plants varied with species. All plants of *Desmodium distortum* were uprooted in a storm shortly after the first harvest and died. *Desmodium discolor* plants started to lose vigour after the third harvest and most plants died within the next two harvests. *Desmodium salicifolium*, a low-growing shrub, grew well up to harvest 6 but plants started to die after this harvest. The only other species which lost plants during the course of the experiment was *Sesbania grandiflora*. The two established plants yielded well up to harvest 6, but subsequently, yield dropped sharply and one of the two plants died after harvest 7.

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Conclusion

Of the 13 tree legume species evaluated, *Calliandra* sp. CPI 108458 produced by far the highest leaf yields. Other potentially useful species were *F. macrophylla*, *C. calothyrsus* (local), *G. sepium* (local), *D. rensonii* and *C. gyroides*.

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Reference

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