

Leucaena in northern Australia: a forage tree legume success story

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Introduction *Leucaena leucocephala* (leucaena) is a long-lived, perennial forage tree legume of very high nutritive value for ruminant production. In northern Australia, leucaena is direct seeded into hedgerows 5-10m apart, with grass species such as buffel grass (*Cenchrus ciliaris*) planted in the inter-row to form a highly productive and sustainable grass-legume pasture that cattle graze directly. It generally is grown on deep, fertile soils in sub-humid environments with average rainfall of 600-800mm/year. Steer gains of 275-300kg/head per year are achieved, with short-term daily gains over the main growing season >1kg/head. Being very deep-rooted, leucaena exploits moisture beyond the reach of grasses and remains productive well into the dry season. Once established, leucaena-grass pastures remain productive for >40 years.

Extent and Benefits Large-scale adoption has occurred in the past 5-10 years, with the area under production increasing from an estimated 35Kha in 1994, to 100Kha in 2004. Over 400 graziers have successfully established leucaena, with some planting as much as 2Kha. Leucaena-grass systems provide 3 bottom-line benefits contributing: (1) economic benefits from estimated annual gross earnings of 20M AU\$; (2) social benefits stemming from the stable income and ease of management afforded by established leucaena pastures, and (3) environmental benefits through reduced soil erosion and dryland salinity, and increased soil fertility arising from the deep-rooted, permanent, leguminous nature of the system.

Major reasons for success

1. Leucaena technology meets farmers' needs Leucaena gives a profitable and highly sustainable option for beef producers targeting high-value export and domestic markets. It also offers an alternative to annual crops that are unreliable in this drought-prone environment, and to improved grass pastures that become N-deficient and unproductive within several years of planting and fail to support high liveweight gains.
2. Technological constraints have been addressed Many technological constraints had to be addressed over the past 40 years to facilitate successful integration of leucaena into Australian grazing systems. Working both individually and collaboratively, scientists and graziers have overcome the constraints. The discovery of *Synergistes jonesii*, a ruminal bacterium that can counter mimosine/DHP toxicity, was largely the work of a researcher, whereas advances in seed scarification technology were largely the work of a grazier. Partnerships between researchers and graziers have been important in addressing establishment issues of weed control and soil insect control, whilst teams of researchers have worked to broaden the agronomic potential of leucaena through germplasm evaluation and plant nutrition studies.
3. Dedicated champions Long-term commitment of dedicated and enthusiastic graziers, extension officers and scientists, working both collaboratively and individually, have developed the support services needed to overcome technological barriers to adoption.
4. Support services The industry is well supported now. The supports include reliable supplies of high quality seed (20-40t produced/year), contract planting services, effective herbicides and insecticides, mimosine-degrading bacteria, and high quality technical advice on establishment and management. Strong collaborations between graziers, extension workers and scientists have culminated in the formation of The Leucaena Network, a community organisation formed to address new research and development issues and to promote the responsible use of leucaena as a grazing resource. The Leucaena Network conducts grazer-oriented training courses and collaborative research projects with universities and government agencies.

The future Leucaena-grass systems are being rapidly adopted now by graziers in northern Australia, with plantings of 16Kha planned for the coming season and >1Mha of land in northern Australia being well-suited to leucaena production. The benefits of leucaena-grass systems now are considered sufficient to justify the high costs of establishment (250AU\$/ha). However, leucaena has the potential to become an environmental weed that could limit future development of leucaena as a grazing resource. This is being debated currently. The Leucaena Network has engaged proactively with relevant government agencies and environmental groups, and has developed a Code of Practice to limit the spread of leucaena from grazing properties. Assuming a favourable resolution of this issue, and continuing strong beef cattle prices, leucaena will be adopted increasingly as a sustainable grazing resource by northern Australian graziers.