

Second edition



Leucaena

The productive and sustainable forage legume



**THE UNIVERSITY
OF QUEENSLAND**
AUSTRALIA



**Queensland
Government**

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The productive and sustainable forage legume

Second edition

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The benefits of leucaena

- ✓ **Better weight gains for longer.** Leucaena is the most productive and most sustainable tropical forage legume. No other forage plant can put the same weight on stock over so long a period of the year.
- ✓ **Top nutritional value.** Leucaena leaf is high in protein and is easily digested by ruminants; it rivals lucerne in feed value.
- ✓ **Highly palatable.** Cattle prefer leucaena to most other forages, making for high intake and subsequent weight gains.
- ✓ **No danger of bloat.** Leucaena does not cause bloat—unlike lucerne or clovers.
- ✓ **Flexible markets.** Excellent weight gains allow you to target the best markets at times when prices are highest.
- ✓ **Drought proofing.** Leucaena keeps producing high-quality green leaf through dry periods during summer, autumn and early winter.
- ✓ **Long life, lower cost.** Once leucaena is established, it can last for more than 30 years; no need for annual forage crops.
- ✓ **Improves soil fertility.** Nitrogen fixed by leucaena reverses 'nitrogen run-down' seen in pure-grass swards and improves grass quality and quantity.
- ✓ **Reduces soil erosion.** Leucaena and vigorous grass planted across the slope encourage water infiltration and reduces run-off.
- ✓ **Prevents rising water tables and salinity.** Leucaena's deep roots can extract water from the soil to a depth of 3–5m thus preventing rising water tables that can bring salt to the soil surface.
- ✓ **Reduces greenhouse gasses.** Carbon is sequestered in the woody growth. Highly digestible leucaena diets can reduce cattle methane production by 20–40%.



but ...

Agronomic considerations

- ? **Only on good soils.** Leucaena grows best on deep fertile soils.
- ? **Costly to establish.** Leucaena seedlings do not compete well against grasses or weeds, which must be effectively controlled.
- ? **No frost tolerance.** Frost kills leaf and stems to ground level (although plants regrow from root crown).
- ? **Psyllid insects** can devastate new leaf, especially under coastal humid conditions.

Management considerations

- ? **High palatability** means that leucaena needs suitable management to prevent overgrazing or wasteful utilisation.
- ? **Mimosine toxicity.** Leucaena can be toxic if the animals are not inoculated with special rumen bacteria.

Environmental considerations

- ? **Heavy seed production** in ungrazed areas, such as roadsides, can allow leucaena to spread and become an environmental weed.

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Foreword

From very humble beginnings in 1955, when variety trials were first conducted at CSIRO Samford Research Station, the area of land in northern Australia under leucaena pasture has grown to cover 200,000–300,000 hectares with some 4000–6000ha of new plantings each year. Leucaena now makes a substantial contribution to the diet for well over 200,000 cattle each year. Continuing seed sales indicate that this area and its economic significance will increase substantially in the future.

Since the first edition of this book, leucaena continues to thrive and create wealth for the beef industry. Whilst adoption is growing at a moderate pace, there have been significant developments. It is now eighteen years since a new breeding proposal for a new psyllid-resistant variety was accepted and funding approved. The variety now named cv. Redlands has been released and grazing trials are in progress. The results so far, after ten months of grazing, have shown similar performance to cultivar Wondergraze in a low psyllid environment. In psyllid-prone environments Redlands will give superior results, thus considerably extending the area suitable for leucaena development.

Another important advance has been the development of a pasture-fed cattle standard that is now officially known as PCAS (the Pasturefed Cattle Assurance Scheme). The Teys Aust. 'Grasslands' brand is now well established and attracts premiums above grain-fed beef in both domestic and US markets. Leucaena is a major driver of this brand.

Further research has been done on the management of leucaena toxicity. Studies in Indonesia by Max Shelton and his team demonstrate that cattle without the manual introduction of *Synergistes jonesii* were not affected with toxicity problems. The cattle in the grazing trial with cv. Redlands that is currently being conducted have not been inoculated, have suffered no ill effects and are performing well. Much discussion is also being centred around the need for an applied *Rhizobium* for nitrogen fixation by the leucaena, and this area requires additional research as areas of feral leucaena, where the seed has never been inoculated, grow strongly with good leaf colour.

Finally, I would like every leucaena grower to pause and give a thought to all the people who have been involved in the research and development of this remarkable plant. There are too many to mention all but I will mention one who has made an enormous contribution. Professor Jim Brewbaker from the University of Hawaii has made an outstanding and lifelong contribution to teaching and research supervision of students from around the world. His research on the genetics and breeding of the *Leucaena* genus has directly contributed to the varieties now available in Australia.



Greg Brown
North Queensland Grazer
Current member of North Queensland Beef Research Committee
Former member of Northern Australian Beef Research Council
Former President of the Cattle Council of Australia

Preface

The first historical records of the use of leucaena by man date back several millennia from excavations in Mexico where it was used as a food for humans. The first known use as forage for livestock has been more recent – Asian smallholders were feeding leucaena to cattle in eastern Indonesia in the 1930s and in the Philippines in the 1970s.

Research into leucaena's value as forage in Australia began in the 1950s, but it was not until the 1990s that large-scale adoption gained momentum, with many factors contributing to this lag between first research and uptake of the technology by graziers. Since the 1980s, dedicated champions – researchers, advisors and innovative graziers – have worked together to solve the outstanding problems. Improved establishment and management practices have led to markedly increased adoption in the 1990s.

Key developments have included:

- solving the mimosine toxicity problem
- more reliable establishment practices, especially weed control
- improved plant and animal management
- improved varieties, seed quality and treatment
- comprehensive economic analysis of the costs and returns
- greater appreciation of the positive and negative environmental impacts of leucaena.

The formation of The Leucaena Network in 2000 brought together many forward-thinking graziers who negotiated with Queensland Government agencies on policies for the responsible use of leucaena. It worked closely with research agencies firstly with the University of Queensland, and the Queensland Department of Agriculture and Fisheries (QDAF) to support research and training initiatives.

University of Queensland researchers, with decades of experience, teamed with successful leucaena graziers to ensure a balance of theory and practice, and delivered 30 Leucaena for Profit and Sustainability training courses between 2004 and 2010.

With financial support from MLA, the course notes were upgraded into the first edition of the Leucaena book in 2006. Since then, much new information has been generated from around the world and has been collated in this 2020 updated edition. The information will be invaluable to new and existing growers, extension specialists, students and researchers wishing to learn more about the best ways to establish and manage leucaena.

Max Shelton, Scott Dalzell, Nigel Tomkins and Stuart Buck



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Figures

We thank QDAF for permission to use and modify the figure of liveweight gains from pasture, and PROSEA (Plant Resources of South East Asia) for the illustration of the leucaena plant.