Final report

PDS Sustainable Long Term Leucaena Grass Production in Northern Australia

Project code: L.PDS.1909
Prepared by: Bron Christensen
The Leucaena Network
Peter Shotton
Northern Territory Department of Industry, Tourism and Trade

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1 Abstract

The Sustainable Long Term Leucaena Grass Production in Northern Australia Producer Demonstration Site aimed to address the protein drought experienced by northern Australia cattle producers for long periods of the year.

The tropical legume, Leucaena has the potential to augment the relatively poor nutritional value of the northern Australia’s native grass pastures, enabling timely and improved weight gains to meet market specifications. More than 7.5 million ha of the Northern Territory is suitable for leucaena-grass grazing systems however limited access to experienced local producers and assistance has proven a barrier to the take up and successful establishment of the legume.

The Sustainable Long Term Leucaena Grass Production in Northern Australia project aimed to successfully establish up to six producer-based leucaena trial plantings to determine the most suitable variety and row spacings suitable for Northern Territory conditions.

Three sites were successfully established however fire resulted in the withdrawal of one of these sites. A fourth site was unable to undertake establishment activities within the project due to alternative diversification, however, remains committed to the inclusion of leucaena in their grazing system in the future. The two remaining sites demonstrated successful establishment and improved productivity through one live weight gain trial on each site, demonstrating the potential benefit to the Northern Territory grazing industry.

Extension activities were directly provided to more than 190 observer producers across six field days and workshops. Project progress and periodic outcomes were also promoted through other Network activities, at www.leucaena.net and in project case studies for dissemination to the grazing industry. Complementary to the Sustainable Long Term Leucaena Grass Production in Northern Australia project was the development of the Northern Best Management Code of Practice, a collaborative outcome from the Northern Territory Government, The Leucaena Network, Northern Territory Cattlemen’s Association, NT Farmers and project producers.

Interest from Northern Territory graziers to improve productivity and profitability with leucaena remains high, however due to alternative opportunities for high-value enterprise diversification with the developing cotton and horticultural industries, the propensity to undertake leucaena plantings in the near future has reduced from the initial levels experienced at the commencement of this project. However, it is envisaged that interest in pasture development with leucaena will increase over the next three to five years as the increased profitability provided by diversification will provide the financial wherewithal for property development, or there will be a percentage of natural attrition out of the new industries and a return to a focus on grazing. The activities undertaken within this project and the continued presence of The Leucaena Network in the Northern Territory grazing industry will continue to provide ongoing support for those graziers.
2 Executive summary

Background

More than half of Australia’s beef herd is located in northern Australia. A key challenge faced by northern producers is to obtain the rapid weight gains required to meet market specifications because of the relatively poor nutritional value of tropical grass pastures for long periods of the year. More than 7.5 million ha of the Northern Territory is suitable for leucaena grass pastures however a history of failed establishment or management and limited access to experienced local producers and assistance has previously proven a barrier to the take-up of leucaena as an addition to grazing systems.

Producers are now looking to maximise their output from their Leucaena plantings through increased carrying capacity; improved cattle live weight gains; earlier finishing and the ability to meet the market. The development of a psyllid tolerant leucaena variety, Redlands will provide suitable coastal areas of the Northern Territory to include leucaena in their grazing systems.

To address the barriers to uptake, the Sustainable Long Term Leucaena Grass Production in Northern Australia aim was to successfully establish producer-based leucaena trial plantings to determine the most suitable variety – Redlands, Wondergraze or Cunningham; and row spacings suitable for Northern Territory conditions.

The activities and outcomes of the project were disseminated to the wider Northern Territory grazing industry through field days, workshops, trade stands, video blogs and the development of case studies.

A concurrent activity resulting from the commencement of this project has been the collaboration of the Northern Territory Government, industry representatives, local producers and The Leucaena Network to develop the Northern Territory Best Management Code of Practice for Establishing and Managing Leucaena Pastures.

Objectives

By August 2022 the PDS activities will:

1. Demonstrate the most suitable leucaena-grass pasture system for northern Australia across 4 to 6 sites in NT
   The two successful sites demonstrate that leucaena could be successfully established in the Douglas Daly region of the Northern Territory with the preferred cultivar being Wondergraze and then Cunningham; and row spacings of 14m with twin rows with 75cm to 1m spacings.

2. Quantify the benefits of leucaena-grass pasture system through a minimum of one round of grazing trials at each site.
   The two grazing trials by the successful producers demonstrated wet season weight gains up to 1.3kg per head per day or 4.1kg per day per hectare; and dry season weight gains (without supplementation) of 0.3kg per day or 1.0kg per day per hectare.
3. **Promote best management practice to 100 other producers and graziers across a minimum of four field days throughout the three-year period.**

   Four dedicated project field days were hosted by trial producers throughout the three-year period with attendance of 98 producers and graziers. In addition, the project was showcased at three additional NT departmental field days with an attendance of more than 100 attendees.

4. **Increase the adoption of best practice leucaena-grass pastures by 10% of the observer producers by the end of the three-year period.**

   Currently, only one producer has undertaken additional leucaena plantings as a direct result of the project. This is significantly reduced from the expected adoption due to opportunities presented by other high value enterprise diversification opportunities available to local graziers.

   The post-project survey has indicated an increase in the propensity to introduce leucaena into grazing systems by 106% over the next two to five years.

5. **Provide capacity building through upskilling of local agronomy services in Leucaena best practice through the provision of two Leucaena 101 workshops focussing on advisory and extension knowledge.**

   Attendance by the region’s agronomy services at all project producer workshops and field days resulted in significant capacity building of the ability for local agronomy services to provide high-value assistance to local graziers.

6. **Development of case studies on each producer site (4 to 6) documenting trial processes, outcomes and feedback for dissemination through The Leucaena Network channels, NTDPiR, NTCA, NT Farmers, Future Beef and MLA media.**

   Case studies were developed for the two successful sites. These were disseminated through subsequent workshops and field days; trade stands at Beef 2021, NTCA 2021 Conference, NT Farmers Food Futures 2021 Conference, and the Northern Beef Producers Expo; and at all Network workshops and events. Both producers also featured in the Leucaena Network’s ‘Let’s Talk Leucaena’ information video available at [www.leucaena.net](http://www.leucaena.net).

**Methodology**

This PDS aimed to involve up to six producers located in the Douglas Daly region of the Northern Territory, as identified by the NT Department of Industry, Tourism and Trade (DITT). DITT would provide support and agronomy services to the trial producers. Each site would plant either a 5ha irrigated trial site (single variety); or a 30ha dryland site comprising plantings of three cultivars – Redlands, Wondergraze and Cunningham; at row spacings from 6m to 18m.

Once successfully established, each site would undertake at least one round of grazing trials to assess live weight gains from the leucaena-grass pastures.
Results/key findings

Three sites were successfully established however fire resulted in the withdrawal of one of these sites. A fourth site was unable to undertake establishment activities within the project due to alternative diversification although remains committed to the inclusion of leucaena in their grazing system in the future.

The two remaining sites demonstrated successful establishment and improved productivity through one live weight gain trial on each site, demonstrating the potential benefit to the Northern Territory grazing industry.

There was minor psyllid pressure experienced by the plantings in the Douglas Daly region, resulting in a preference for the Cunningham or Wondergraze varieties.

The preferred row spacing was wider than expected at 12m to 14m to enable the jarrah inter-row pastures to be grazed to the same intensity as the leucaena, however more intensive grazing systems would benefit from closer 7m row spacings.

Live weight gains averaging 1.3kg/head/day during the wet season and 0.3kg kg/head/day during the dry season were experienced as part of the grazing trials.

Benefits to industry

Knowledge that leucaena is able to be successfully established in the Northern Territory to improve enterprise productivity.

Facilitation of experienced graziers with local knowledge of strategies for successful leucaena establishment and use.

Capacity building of agricultural service providers to provide current and timely, local advice and support to potential leucaena producers.

Future research and recommendations

Opportunities for further assistance to the Northern Territory’s leucaena industry include further assessment of indicative ratios of dry feed to leucaena required for optimum productivity throughout both the dry and wet seasons; additional live weight gain trials for further reinforcement of the potential of leucaena to add value to productivity and sustainability during varying seasons; ongoing exposure to experienced leucaena producers for knowledge sharing; and the continuation of access to qualified advice at all stages of the leucaena journey, particularly until grazing commences.
## 3 PDS key data summary table

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<td><strong>% practice change adoption – core:</strong></td>
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1. Background

1.1 Aim

Leucaena grazing varieties were initially made available to Australian graziers in the early 1960’s by CSIRO. Since that time, the industry has flourished with the development of improved cultivars particularly the recent addition of the psyllid tolerant Redlands variety. This and the expected successful outcome of current research into a sterile variety will open up the benefits of increased cattle carrying capacity and weight gain to vast numbers of producers in Northern Australia.

More than half of Australia’s beef herd is located in northern Australia. However, a key challenge faced by northern producers is to obtain the rapid weight gains required to meet market specifications because of the relatively poor nutritional value of tropical grass pastures for long periods of the year. As indicated in the preliminary insights from the MLA commissioned report the Adoption of Leucaena Grass Pastures in the Northern Beef Industry Project undertaken by Rural Consulting Group, approximately 16% (88,106,354 ha) of Northern Australia fits the broadest temperature/rainfall/soil requirement for leucaena, comprising 6048 properties and 6,302,595 cattle. 5% of Northern Australia meets the ideal rainfall and soil characteristics for leucaena equating to 3,549,222ha of land in the Northern Territory that is ideal for grazing development with leucaena-grass pastures, not considering tenure restrictions.

Producers are now looking to maximise their output from their Leucaena plantings through increased carrying capacity; improved cattle live weight gains from 0.7 to 1.5 kg per day and 250 kg per annum; earlier finishing and the ability to meet the market. This benefits the red meat industry as a whole however places significant pressure on leucaena plantings.

Current estimates of leucaena plantings in the Northern Territory are less than 1,000 ha, with significant plantings over the previous 30 years of which less than 24% were successful or remain. Some of the reduction in plantings may be attributed to utilising establishment and grazing strategies more suited to southern and eastern land types and climates and high psyllid pressure in coastal regions. The ability to introduce the psyllid tolerant leucaena Redlands variety in psyllid prone areas of the Northern Territory will enable improved establishment and resulting increased productivity.

To date, the Leucaena industry has been most predominant in Central Queensland resulting in the compilation of industry benefits and best-practice information based on Central Queensland’s climate and geography. There have been some longer-term productivity trials with leucaena pastures undertaken at the Northern Territory Government’s Douglas Daly Research Farm however the Northern Australian leucaena industry would benefit from information gained from establishment trials in the emerging areas including the Northern Territory.

One issue of significance pertinent to Northern Australia and particularly the Northern Territory is the relationship between the wet and dry season and the optimal row spacings and resulting Leucaena to grass ratio to enable weight gain and pasture maintenance throughout both seasons. Excessive leucaena plant growth in the wet season will require heavy grazing to ensure height control whilst heavy grazing will affect the ability for the grass-pasture to provide the necessary biomass throughout the following long dry season. The alternative will be mechanical trimming of the Leucaena in alternate...
years which is neither cost effective nor desired. This issue will have a direct influence on the row spacings, weight gain performance and grass/Leucaena consumption.

This provided a key opportunity for producer led demonstrations into the most effective leucaena-grass pasture systems for the Northern Territory incorporating row spacing, cultivar choice and management practices for successful establishment and best practice strategies to maximise the output of this grazing system. These trial sites provide valuable information to other, individual Northern Territory producers as to Leucaena best practice, as well as to the grazing industry in its entirety.

Another issue identified in the adoption of Leucaena in the Northern Territory is the limited access to qualified and experienced advice and extension support for potential producers. Currently, most extension on Leucaena plantings is provided by Peter Shotton of the Northern Territory Department of Industry, Tourism and Trade (DITT) located at the Douglas Daly Research Farm.

Initial meetings with Northern Territory Farmers (NTFarmers) and the Northern Territory Cattlemen’s Association (NTCA) and individual agronomy service providers have indicated a recognition of the benefits of Leucaena and a belief that there is significant potential for future plantings requiring a higher level of expertise to be available to graziers, through the engagement of their own agronomy services. This provided a significant opportunity for capacity building of local agronomists and service providers to assist this emerging industry with knowledgeable and proven information and assistance.

Overall, this Producer Demonstration Site aimed to generate the information required for successful development and management of leucaena-grass pastures in the Northern Territory. This then has a direct impact on the long-term sustainability of both the individual grazing enterprises and the communities in which they reside.

1.2 Methodology

This PDS aimed to involve up to six producers located in the Douglas Daly region of the Northern Territory. Consultation by the NT Department of Industry, Tourism and Trade (DITT) identified four Douglas Daly based graziers to form the core producers for the project. Support and agronomy services to the trial producers and localised reporting on all four sites was provided by DITT.

One irrigation site was identified with an irrigated 5 ha block Redlands (psyllid tolerant) leucaena under trickle tape irrigation to be planted. This site was not to be replicated due to the inability of water access by other producers but was to be compared against the dryland sites to determine any productivity benefits between irrigated and dryland leucaena.

The remaining four dryland sites would each plant a 30ha trial site comprising Wondergraze, Redlands and Cunningham planted from 6 m to 18 m (single) rows.

The inclusion of the three different varieties in the trial would enable the producers to determine which is the most suitable variety for their property and the region. The ability to compare the three varieties in-situ will also assist to determine if there is a potential psyllid challenge in the area which has not been documented to date.

Prior to sowing, soil samples from each site were collected to assess the fertiliser requirements and benchmarking initial soil fertility levels.
Fully established trial sites, including the 5ha irrigated trial site would undertake a live weight gain trial to enable the collection and comparison of live weight gain data.

Historic qualified data on live weight gain trials on pasture only assess through previous trials at the Douglas Daly Research Farm would provide the control data for comparison of the live weight gain achieved by the leucaena-pasture system.

Extension and adoption activities would include open field days at each trial site and promotion of the activities of the trial through The Leucaena Network and local industry bodies.

### 1.3 Initial Trial Establishment

Four producers were identified through DITT’s Producer Group to participate in the PDS. Individual consultation was undertaken with each of these producers to secure their commitment to the trial and to identify the trial sites on each property. The trial producers were:

- Christopher and Amanda Howie – Bindaroo Pastures, Douglas Daly
- Logan Reid – Blackbull Station, Douglas Daly
- Brett and Suzanne Gill – Malilangwe, Douglas Daly
- Tony Hayne – Douglas Station, Douglas Daly

#### 1.3.1 Bindaroo Pastures

Property owners Chris and Amanda Howie confirmed the site’s suitability with soil tests prior to planting and early establishment was reviewed by both DITT’s Peter Shotton and QDAF’s Stuart Buck. The site was located at the entrance to Bindaroo Pastures in a small paddock suitable for ongoing review of the leucaena and for finishing or backgrounding smaller numbers.

Bindaroo Pastures 10ha irrigated trial site was planted on 29 January 2019 in twin rows with 7m spacings and 80cm centres. A lower emergence percentage (50%) resulted in a replant undertaken on 21st February 2019 which resulted in the more acceptable 70% germination and emergence.

Early establishment of the site was encouraging however a mite infestation at the site in March 2019 hindered subsequent growth. Application of insecticide addressed this issue however the plants did not gain the full benefit of the expected seasonal growth.

In August 2019, the trial paddock was part of the property subjected to a hot fire. 85% of the plantings were affected by the fire of which approximately 40% recovered. The property owners had intended to undertake a re-plant in 2020 however the opportunity to enter the cotton industry, which became permissible in the Northern Territory in 2018, resulted in a re-focus of the business agronomy activities towards cotton and a withdrawal from the trial.

The remaining 40% of leucaena on Bindaroo Pastures remains in place and is utilised as a standard pasture paddock.
1.3.2 Blackbull Station

Blackbull had an existing 60ha of established or early established leucaena prior to commencing the trial. This site had experienced significant weed pressure resulting in some establishment issues and an unexpected workload to ensure successful establishment.

Blackbull’s manager, Logan Reid determined a trial site located in the middle of Blackbull Station based on the excellent existing pasture growth to complement the leucaena, the existing smaller paddock size, enabling ease of movement of cattle through the leucaena paddocks once established. This decision was also supported with soil testing of the site.

Blackbull Station undertook the demonstration site planting on 12-13 January 2020 with twin rows with 60cm centres with 10ha Cunningham at 6m row spacings, 10ha Redlands at 12m row spacings and 10ha Wondergraze at 18m row spacings. An additional 17 ha of Cunningham at 6m row spacing was also planted to fill the trial paddock.

1.3.3 Malilangwe

An interest in maximising Malilangwe’s grazing productivity led Brett and Suzanne Gill to participate in this establishment trial.

Two sites were considered on Malilangwe however after consultation, one site was deemed preferable. This was also supported by soil tests.

Despite a significantly reduced rolling average rainfall for Malilangwe over 2019 and the beginning of 2020, the trial plantings were undertaken on what was classed as ‘dry’ conditions for the NT wet season on 31 January 2020. Planting was based on forecasted imminent follow up rain. However, with a lack of follow up rainfall and any significant rain events for the remainder of the wet season, germination was very poor, at approximately 40%.

A review of the plantings in April 2020 identified additional establishment losses due to the dry conditions with ongoing establishment at approximately 20% and a high level of seedling stress.

Due to the low and uneven Leucaena row establishment, dry conditions and the unlikely result of much of the Leucaena surviving the dry season it was decided to utilize the available pasture for cattle grazing (dry season) and re-plant the trial next wet season (2020 – 2021).

A successful re-plant was undertaken on 20 January 2021 with twin rows with 75cm centres. 3.5 ha each of Cunningham, Redlands and Wondergraze was planted in 7m row spacings and an additional 3.5 ha each of Cunningham, Redlands and Wondergraze was planted in 14m row spacings. Improved pasture of Jarrah grass was planted the following day in 5m strips between the 7m leucaena rows and 10m strips between the 14 metre rows. The plant was successful with 80% germination however heavy predation in rows closest to retained bushland was experienced, resulting in 70% establishment.

A light graze was undertaken 11 months after establishment with several grazes during the following wet season.

1.3.4 Douglas Station

Tony Hayne of ‘Douglas Station’ commenced the trial with intentions of establishing a total 1000ha of leucaena over a two-year period. Insufficient, consistent rain prevented initial planting of the trial
followed by a refocus of the business agronomy activities to cotton resulting in a withdrawal from the trial.

2. Objectives and Outcomes

By August 2022 the PDS activities will:

1. Demonstrate the most suitable leucaena-grass pasture system for northern Australia across 4 to 6 sites in NT by:

a. Assessing optimal row spacing 6 m to 18 m for dryland and 3.6 m or 7.4 m for irrigated Leucaena-grass pastures for long term success and viability.

As noted, the irrigated leucaena at Bindaroo Pastures was planted in twin rows with 80cm centres and seven metre row spacings. This was deemed optimal for both pasture growth and machinery access. Due to the subsequent decimation of the trial plot by fire, further assessment on the suitability of this row spacing was not possible.

After undertaking a six-month, dry season grazing trial, Blackbull Station’s preferred row width for the smaller paddock and more intensive grazing management was 7m, however it is expected that any future plantings will be on a larger scale with 12m row spacings.

Brett and Suzanne Gill have found that due to the amount of jarrah grass required to balance large quantities of available leucaena from all cultivars, the 14 metre, twin rows with 750mm centres is the preferred row spacing for Malilangwe’s plantings. They believe this spacing ensures that cattle receive sufficient nutrients from both pasture species for maximum weight gain and allows them to turn cattle off the paddock with both leucaena and grass at similarly grazed levels.

b. Assessing the most suitable leucaena cultivar for each trial site

A review of Blackbull’s plantings at six months indicated that whilst plant height, population and growth varied significantly over the entire trial paddock, one specific cultivar could not be identified as experiencing better or worse establishment. Due to the drier conditions in the initial twelve months of establishment, all three varieties had some leaf drop and small plants < 0.2 m high appeared stressed due to no significant rainfall since early establishment.

Full establishment and subsequent grazings have indicated that either Cunningham or Wondergraze have performed better on Blackbull Station with similar biomass and recovery with a slight preference for Wondergraze. Redlands has not performed as well as expected and has exhibited a very low biomass.

Both Malilangwe’s first and second plantings also indicated that there was not one variety which experienced better or worse establishment, plant population or growth. However, once fully established, the Wondergraze variety had more foliage and biomass consistently across grazings. It is to be considered whether the Cunningham plantings were disadvantaged, being the variety closest to the native bushland and more susceptible to predation.

As with Blackbull, the Redlands variety on Malilangwe has a lower biomass, compared to the other two cultivars.

Whilst, based on previous trials undertaken on the Douglas Daly Research Farm, it is expected that the Douglas Daly region will experience some psyllid pressure in the future, it is not expected that it will
be significant enough to dramatically affect the productivity of the non-psyllid varieties of Wondergraze or Cunningham. In more coastal areas of northern Australia, where psyllid pressure can be intense, the Redlands variety would be more suitable, exhibiting increased tolerance of psyllids and a quicker recovery from infestations.

c. Determining and documenting effective management strategies to address seasonal growth issues of leucaena-grass pastures

The definitive wet and dry seasons experienced by the Northern Territory’s Top End provides both benefits and challenges in the establishment and long-term management of leucaena as part of a grazing system.

Site Preparation
The Top End long-term average wet season rainfall of more than 1200mm usually ensures sufficient soil moisture for successful leucaena establishment however difficulties can be experienced in site preparation. The rampant pasture and weed growth resulting from the rainfall and warmer days can provide a high level of ground cover to remove by either mechanical or chemical means to enable seed planting and soil contact for pre-emergent herbicides.

The propensity for monsoonal rains and resulting potential soil erosion on bare ground may limit the site preparation for leucaena plantings to strip cultivation through mechanical or chemical methods rather than full paddock cultivation to enable the sowing of improved pasture concurrently. This is an individual decision for each grazier to balance the erosion risk with increased weed pressure on the emerging seedlings.

No-till planting, whilst mitigating some of the risks of excessive overland flow, seed dispersion and erosion can result in low emergence and establishment due to weed or existing pasture pressure smothering the new seedlings.

Establishment
The tropical monsoonal climate generally provides an assurance of significant rainfall throughout the wet season enabling a level of confidence in being able to establish leucaena. However, like most areas of Australia, this rainfall can be patchy and not consistent across a region, resulting in either inadequate soil moisture for planting or early establishment stress or failure due to an unexpected early end to the wet season.

The monsoonal rains, if received at germination or very early establishment can result in significant seed or seedling loss due to the overland flows and/or erosion.

Weed Pressure
The Top End’s monsoonal rains generally provide excellent soil moisture and establishment conditions for other plants, pastures and weeds as well as leucaena. This can result in excessive weed pressure and requires a high level of management to remove the weed pressure from the fledgling leucaena seedlings through mechanical or chemical means.

Row Spacing
The definitive wet and dry seasons experienced by the Top End of the Northern Territory provides for high levels of growth of both the leucaena and inter-row pasture during the wet season and low or no growth for inter-row pasture and minimal growth for the leucaena during the dry season. This enables high levels of grazing pressure during the wet season with rapid regeneration of both the leucaena and grass pasture. The dry season requires a higher level of management to ensure the
grass pastures are not sacrificed to maximise the grazing opportunities presented by the more resilient leucaena. The wider row spacing of up to 14m preferred by the trial producers is expected to provide sufficient pasture for even grazing.

**Long-Term Management**

The excessive plant growth exhibited by all flora during the NT Top End’s wet season requires vigilance in the management of ‘volunteer’ leucaena that may establish between rows or outside of the planted area. The corresponding increased levels of herbivore predation assists to mitigate the establishment of volunteer leucaena seedlings however if unchecked, good seasons can result in increased unwanted leucaena establishment requiring an increased workload for removal.

2. **Quantify the benefits of leucaena-grass pasture system through a minimum of one round of grazing trials at each site.**

The successful establishment of the Blackbull Station and Malilangwe leucaena trials enabled the completion of one live weight gain trial on each property.

Blackbull Station’s grazing trial on the leucaena trial paddocks commenced in June 2021 with 88 weaners with an average weight of 102.9kg, inducted on the 28 June. The weaners were removed from the paddock on 9 December 2021 with an average weight gain of 55kg. This daily weight gain of 0.3kg unsupplemented compares favourably with expected weight gain from unimproved pastures during the dry season of 0.1kg – 0.2kg supplemented.

Due to the later successful establishment of the leucaena trial on Malilangwe, a shorter-term live weight gain trial was undertaken at the end of the wet season 2022. The trial included a heavier stocking of 88 head for a period of 27 days with an average daily gain of 1.3kg per head per day. This gain is in line with the expectations of newly established leucaena in a good wet season in the region, based on historical trials undertaken at the Douglas Daly Research Farm.

Historical leucaena and pasture trial results from the Northern Territory Department of Industry Trade and Tourism’s Douglas Daly Research Farm is expected to be published as part of P.PSH.2006 by May 2023.

3. **Promote best management practice to 100 other producers and graziers across a minimum of four field days throughout the three-year period.**

The Sustainable Long Term Leucaena Grass Production in Northern Australia project objectives and periodic outcomes has been showcased through four project Field Days and at three Northern Territory Agriculture Field Days.

As part of the desired outcomes of the trial producers to have increased exposure to experienced leucaena producers and industry, each Field Day included a visit by an established leucaena producer or industry representative. Visits to each trial site and discussions with each individual trial producer were also undertaken to maximise the value of attendance of the guest producer.

The initial Field Day was held at the commencement of the project, specifically for information sharing and integration of the four individual sites located in the Douglas Daly region. The day commenced with a Leucaena 101 with agronomist Stuart Buck of Queensland Department of Agriculture and
Fisheries and researcher Peter Shotton of the NT Douglas Daly Research Farm. The trial producers benefitted from the knowledge of more than forty combined years involvement with the leucaena industry, with a focus on the available research into the establishment and management of leucaena in the Northern Territory complementing current best practice for leucaena and establishment in Queensland.

Following the workshop, all project producers visited the four individual properties and the relevant trial sites.

The second, public Field Day was held on Thursday 10th October 2019. This was organised primarily by the DPIR (now DITT) and included a workshop incorporating the basics of leucaena establishment and management, natural resource mapping, NT pasture updates, legume agronomy, an introduction to MLA’s Profitable Grazing Systems program and leucaena live weight gain trial results to date (P.PSH.2006). QDAF’s Craig Lemin was in attendance to assist the trial producers and provided an overview of the results to date of the Pinnarendi, FNQ leucaena variety and productivity trial. The day culminated with a site visit to ‘Bindaroo Pastures’ where trial producer Chris Howie was able to provide a first-hand account of his experiences with leucaena establishment and management including weed pressure and fire. MLA’s Grassfed Program Manager, Nigel Tomkins was able to attend and provide information to the producers on the assistance available to graziers through MLA.

Attendance at the Field Day was reduced by half due to a range of fires burning in the NT including several in the vicinity and towards the WA border where several registered attendees were located. A total of 22 people attended the field day.
The third project Field Day was held on-site at Blackbull Station on Wednesday 4 November 2020, attracting 40 attendees. The format of the day included presentations by Blackbull Station’s Manager, Logan Reid and DDRF’s project manager Peter Shotton and Redlands seed producer and grazier Bruce Mayne. Updates on the development of the Northern Territory Code of Practice, University of Southern Queensland’s ClimateMate program, Northern Territory Cattlemen’s Association and Northern Territory Farmers Association were also on the agenda. Attendees visited both the existing and trial leucaena paddocks to view the full establishment of the earlier plantings and the early establishment of the trial paddocks after which the event finalised with the opportunity for further discussion over a barbecue dinner.

The project activities concluded with a final multi-site Douglas Daly Field Day which commenced in the paddock at Malilangwe with producers Brett and Suzanne Gill providing an update on the trial and subsequent productivity increases. The day progressed to Blackbull Station where Logan Reid discussed Blackbull Station’s leucaena experiences and visiting producer Tom Saunders of Whitewater Station gave an overview of his leucaena under trees trial to add value to uncleared land in far north Queensland. Updates were also provided on the Northern Australia live weight gain trial and the industry activities of NT Farmers, NTCA, ClimateMates and NT NRM. The 22 attendees proceeded to view the Blackbull Station’s leucaena plantings prior to progressing to the Douglas Daly Research Farm for further discussion and dinner.
All attendees at all Network Field Days were provided with information packs including Fact Sheets, Case Studies, MLA Leucaena Guide, Membership form, Network overview and presentation handouts.

Feedback from the core producers at the conclusion of the project indicated that:

<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Confidence and Knowledge Prior to Project Participation</td>
<td>4.5</td>
</tr>
<tr>
<td>Average Confidence and Knowledge After Project</td>
<td>8</td>
</tr>
<tr>
<td>Percentage change in Confidence and Knowledge</td>
<td>78%</td>
</tr>
<tr>
<td>Success of project in meeting desired outcomes</td>
<td>9</td>
</tr>
<tr>
<td>Overall satisfaction with participation in the project</td>
<td>9</td>
</tr>
<tr>
<td>Propensity to Consider Further Leucaena establishment</td>
<td>8</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
</tbody>
</table>

**Outcomes:**

Interactions with other growers have been useful and enjoyable.

Still undecided on row spacings.

Feed ratio query still to be answered.

Lots of trial and error but definite learnings.

**Project Participation:**
Time constraints not envisaged at the commencement of the trial limited my ability to fully participate.

Unable to participate in the other producer visits due to time constraints.

Main Benefit of Participation:

Confidence in leucaena’s fit for my operation.

Ending up with a productive 30ha stand of leucaena has proved the value and potential of this plant to provide high value protein to our cattle.

Determining the best varieties and the different ideas on establishment.

Future Plantings:

Target of 500ha when funds allow.

1,000ha is still the aim however timeline may be extended due to the introduction of significant cotton plantings requiring the reallocation of resources.

 Unsure due to sale of property.

Future Activities or Improvements:

Financial funding through MLA to DITT to do research on Douglas Daly Research Farm (DDRF) and to The Leucaena Network to facilitate further producer involvement in trial sites.

Inclusion of funding for fencing (exclusion) to enable a better trial on row spacing

Field visits with experienced members; executive to advise on the latest trends and growing tips.

Feedback from attendees at the Douglas Daly Field Days is summarised below:

*Table 1: Field Day Feedback Summary*

<table>
<thead>
<tr>
<th>Douglas Daly Field Day Responses</th>
<th>November 2020</th>
<th>May 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Attendees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Leucaena Plantings (ha)</td>
<td>72</td>
<td>117</td>
</tr>
<tr>
<td>Planned Leucaena Plantings (ha)</td>
<td>530</td>
<td>2210</td>
</tr>
<tr>
<td>Average Confidence and Knowledge Prior to Attendance (rating 1 = little 10 = considerable)</td>
<td>4</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Average Confidence and Knowledge After Attendance

(rating 1 = little 10 = considerable) 6 8

Percentage change in Confidence and Knowledge 91.50% 18%

Percentage of high level of satisfaction in attendance (rating of 7 or above) 100% 100%

Average Propensity to Consider Leucaena - Grass grazing system (rating 1 = little 10 = considerable) 8.5 9

November 2020 May 2022

- Actual leucaena planting
- Planting methodology
- A better screen for powerpoint presentations
- Provide a copy of the presentations
- A follow up on what Logan does would be good.

- More data
- Perhaps a little more information on the effects on cattle for those who do not know anything about the plant eg Rumen bug.
- I loved the presentations last year - more photos of Qld

- Many questions were not relevant, but the information was helpful.
- Excellent day. As usual, well done. Blown away by the development in the area.
- Have the confidence to recommend planting leucaena.
- It was a thorough and engaging day – excellent!
- A great field day with great speakers.

- Ran very well - lots of information.
- The Field Days are great. Interactive events on the ground!
- Timing of a field day to match green / growth phase and number of days prior to grazing
- Hold another field day earlier in the season to see growth and how it is grazed with the pasture

Further comments / future activities?
The Sustainable Long Term Leucaena Grass Production in Northern Australia project was also showcased at two Northern Territory Department of Industry, Tourism and Trade field days held at the Douglas Daly Research Farm.

All PDS producers attended the initial NT Field Day at Douglas Daly Research Farm held 11 April 2019, attended by more than 70 graziers, industry, and service providers. QDAF’s Stuart Buck, The Leucaena Network’s Bron Christensen and DPIR’s Peter Shotton provided an overview of the trial, leucaena establishment, the Leucaena Code of Practice and the DDRF’s utilisation of its leucaena stands. This presentation was undertaken in the DDRF paddocks, in the leucaena.

The 2021 Northern Territory Department of Industry, Tourism and Trade Field Day was hosted at the Douglas Daly Research Farm on 28 and 29 April. Updates on this leucaena establishment project (L.PDS.1909) and the Northern Australian Grazing Trial Value Chain Economics for Leucaena PDS (P.PSH.2006) were presented to the 40 attendees as part of the day’s program.

All attendees at the NT DITT Field Days were provided with the opportunity to take an information pack including Fact Sheets, Case Studies, MLA Leucaena Guide, Membership form, Network overview and presentation handouts.
Fliers Promoting the Field Days are included in Appendix Three. All events were promoted through The Leucaena Network database, the NT DIIT database, FutureBeef, social media and through the Northern Territory Cattlemen’s Association and NT Farmers.

Promotion of the Field Days and an overview of each Field Day’s activities were included in the bi-monthly newsletter of The Leucaena Network, distributed to more than 700 industry personnel and graziers.

Media promoting the project and field days is included in Appendix Four. In addition, an interview with Matt Bran of ABC Northern Territory’s Country Hour, recorded at the Blackbull Station Field Day in November 2020 and featuring The Leucnaena Network’s Bron Christensen and Blackbull Station’s Logan Reid can be listened to at https://www.leucaena.net/blackbull-station-establishment-sit

4. Increase the adoption of best practice leucaena-grass pastures by 10% of the observer producers by the end of the three-year period. This will be assessed through an annual electronic survey of all field day or activity attendees.

Table 2: Observer Producers Survey Summary

<table>
<thead>
<tr>
<th>Field Day Responses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Attendees</strong></td>
<td>98</td>
</tr>
<tr>
<td>Current Leucaena Plantings (ha) from survey responses</td>
<td>30ha</td>
</tr>
<tr>
<td>Planned Leucaena Plantings (ha) from survey responses</td>
<td>546ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Confidence and Knowledge Prior to Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(rating 1 = little 10 = considerable)</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Confidence and Knowledge After Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(rating 1 = little 10 = considerable)</td>
</tr>
<tr>
<td>7.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage change in Confidence and Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage of high level of satisfaction in attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(rating of 7 or above)</td>
</tr>
<tr>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity / Field Day Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied with the field day. Still keen to establish.</td>
</tr>
<tr>
<td>Happy with what was covered across multiple field days.</td>
</tr>
<tr>
<td>Getting to the cold drinks a bit quicker - folks were standing around chatting for too long and it was hot!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Further comments / future activities?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic reports in the Leucaena newsletter on how local leucaena is going</td>
</tr>
</tbody>
</table>
• Follow up trials for longer term data on management in efficacy in grazing
• Sites in different rainfall/climatic zones eg Douglas Daly vs Katherine / Mataranka etc
• Trial to evaluate required grass pasture % to leucaena %
• Knowing more about when to plant so that money isn't wasted when a crop is likely to fail

5. Provide capacity building through upskilling of local agronomy services in Leucaena best practice through the provision of two Leucaena 101 workshops focussing on advisory and extension knowledge.

As noted in 2.3 a Leucaena 101 workshop for Trial Producers was held on 12th April 2019 to enable the attendance of Stuart Buck. Stuart has been involved with The Leucaena Network and the industry for more than 20 years and could bring extensive experience and information to the Northern Territory producers. Stuart was able to co-present the workshop with Peter Shotton. It was commendable that the focus of the workshop was not how leucaena is traditionally established and managed in Queensland, where most of the research has been conducted but on utilising the available research and information to complement what is known about establishing legumes and pasture in the NT, and particularly in the Douglas Daly region.
To capitalise on the attendance of many of the NT’s agronomists and extension officers at the NT Field Days, it was decided to host the agronomy and service providers’ upskilling as part of the producer 101 workshop. The original Leucaena 101 workshop was extended to incorporate a greater focus on the agronomy of leucaena which provided the PDS producers with an expanded knowledge of the requirements of successful leucaena establishment.

All subsequent field days were attended by a range of NT Top End agronomists and service providers, providing ongoing opportunities for further knowledge-sharing and skill enhancement. Collaborative working relationships have now been established between several agronomy services, producers and The Leucaena Network, enhancing the opportunity for localised specialised advice on best practice leucaena establishment and management in the Northern Territory.

6. Development of case studies on each producer site (4 to 6) documenting trial processes, outcomes and feedback for dissemination through The Leucaena Network channels, NTDPIR, NTCA, NT Farmers, Future Beef and MLA media.

Case studies of the two fulfilled trial sites have been developed.

The Blackbull Station Case Study focussed on early establishment and management, was developed in early 2021 and was distributed to attendees at all subsequent Network activities including workshops, field days and presentations; and the Leucaena Network stands at Beef 2021, Northern Territory Cattlemen’s Association Conference 2021, NT Farmers Food Futures Conference 2021 and the Northern Beef Producers Expo 2022.

The Malilangwe Case Study covered both the leucaena establishment and productivity findings and was developed for distribution to all enquiries eventuating from attendance at the NTCA 2022
Conference, the NT Farmers Food Futures Roadshow 2022, the Northern Beef Producers Expo 2022 and the final project Field Day.

Both case studies will continue to be included in the information package of Fact Sheets, Flyers and Case Studies provided to all enquirers or attendees at all Network events.

Case studies are available for viewing at Appendix 6.1.

Logan Reid and Brett Gill were included in the Network’s ‘Talking Leucaena’ video that was on display at Beef 2021, NTCA 2021 and Food Futures 2021. A link to this video is also included in emailed information packages to all potential producers. This video may be viewed at https://www.leucaena.net/talkingleucaena

An overview of the project including activities and updates on all four sites and video footage of the four PDS producers discussing the project is available for viewing at The Leucaena Network’s website at https://www.leucaena.net/northern-territory-establishment-tr

Periodic project updates from the trial producers and event reports including field days were uploaded to the Leucaena Network’s Facebook page, which has more than 950 followers.

4  Northern Territory Code of Practice

An integral, but unplanned component of the Sustainable Long Term Leucaena Grass Production in Northern Australia project was reinforcing the social licence of the leucaena industry in the Northern Territory through the development of a bespoke Northern Territory Best Management Code of Practice for Establishing and Managing Leucaena Pastures. This code of practice builds on the existing Queensland based Code to provide specific guidelines for paddock, property, and waterway boundaries as well as additional information regarding the benefits of leucaena and the delineation between common and grazing leucaena.

The development of the Code was a three-year consultative process between The Leucaena Network, the Northern Territory Government, and local producers.

The final Northern Territory Best Management Code of Practice for Establishing and Managing Leucaena Pastures was launched at the final project field day held in the Douglas Daly in May 2022.

A copy of the Northern Territory Best Management Code of Practice for Establishing and Managing Leucaena Pastures is attached in Appendix 6.2.

5  Conclusion

The Sustainable Long Term Leucaena Grass Production in Northern Australia project demonstrated the suitability of leucaena to improve grazing productivity in the Douglas Daly region of the Northern Territory.

The Northern Territory’s distinct wet and dry season provides some security of suitable conditions for the planting and early establishment of leucaena, however this distinction does not provide for the possibility of out-of-season rainfall should the wet season be less than average. Consequently, graziers must plant to each year’s conditions. The monsoonal climate of the Top End of the Northern Territory requires careful planning for germination and early establishment to limit the risks of erosion, seed dispersal, crusting and once fully established, intense weed pressure.

Whilst leucaena has demonstrated its hardiness in challenging conditions, to maintain long-term productivity, careful management of the grazing of leucaena throughout the dry season is required.
As demonstrated in previous research projects, the ability for producers to access qualified and experienced advice and information during the ground preparation stage through to establishment is a key component of successful and productive leucaena plantings.

Once established, leucaena has demonstrated the capacity to assist with the ‘protein drought’ experienced by graziers during the dry season and provide improved weight gains during the wet season. In addition, leucaena enables increased stocking capacity compared to native pastures. The project has demonstrated that whilst the Douglas Daly region may experience some psyllid pressure on leucaena plantings, this pressure has not been significant and non-psyllid tolerant varieties of Wondergraze and Cunningham are most suitable for the region. Row spacings of 7 to 14m (depending on acreage of planting and desired grazing management) with twin rows was most suitable for both producers who were able to successfully establish and utilise their leucaena trial.

The potential for further successful leucaena plantings in the Northern Territory has been demonstrated however concurrent to the commencement of this project was the opportunity for graziers to diversify with alternative crops including horticulture and cotton. These opportunities, whilst reducing the initial propensity for leucaena establishment, will result in graziers gaining knowledge and experience of farming systems to the benefit of future leucaena plantings; and additional financial security and capacity for grazing expansion, development, and value-adding through leucaena.

Opportunities for further assistance to the Northern Territory’s leucaena industry include further assessment of indicative ratios of dry feed to leucaena required for optimum productivity throughout both the dry and wet seasons; ongoing exposure to experienced leucaena producers for knowledge sharing; and the ability to access qualified advice at all stages of the leucaena journey, particularly until grazing commences.

5.1 Key Findings

- The Douglas Daly region of the Northern Territory is suitable for the inclusion of leucaena – grass pastures in grazing systems.
- The Northern Territory’s distinct wet and dry seasons provide both security of expected rainfall and parameters which limit the leucaena planting season within the wet season.
- The monsoonal climate of the Northern Territory requires planting strategies to limit erosion and seed dispersal from heavy rainfall and strong management capabilities to mitigate weed pressure.
- The Douglas Daly region of the Northern Territory exhibits low psyllid pressure enabling graziers to utilise all current leucaena varieties.
- The preferred variety of trial producers is Wondergraze.
- The preferred planting row width of trial producers for subsequent plantings on a larger scale will be 12 – 14 metres.
- When fully established, leucaena- grass pastures have the potential to increase both productivity and stocking rate of grazing properties in the Douglas Daly region of the Northern Territory.
- The propensity for the development of grazing land with leucaena, legumes and improved pastures in the Douglas Daly region has been tempered with the increasing adoption of diversification crops including horticulture and cotton.
5.2 Benefits to industry

With more than 7.5million ha of land in the Northern Territory suitable for the successful establishment of leucaena, there is the potential for significant productivity gains for the Northern Territory beef industry from the inclusion of leucaena-grass grazing systems. The provision of high value fodder throughout the dry season will assist to mitigate the protein drought currently experienced by northern graziers and enable increased productivity through improved weight gain, shorter turn off and increased range of markets.

The activities of the project producers, as documented in the attached case studies, provide other graziers interested in establishing leucaena grass pastures with a template of their strategies for successful establishment. In addition, the project producers have shown a willingness to be industry champions, generously providing advice and assistance to potential producers.

The capacity building of the Northern Territory’s agricultural service providers through attendance at the project’s workshops and field days will continue to pay dividends for the north’s grazing industry through the provision of qualified advice, assistance, and linkages.
6 Appendix

6.1 Case Studies

6.1.1 Blackbull Station

Leucaena – A Game Changer for the NT
Logan Reid – Blackbull Station
Douglas Daly  Northern Territory

‘Blackbull Station’ is one of the pick of properties in Douglas Daly region of the Northern Territory however manager Logan Reid is continually looking for ways to improve Blackbull’s grazing potential.

When the opportunity arose to be a part of The Leucaena Network’s MLA funded Producer Demonstration Site to determine the best leucaena variety and row spacing for the Douglas Daly region, he was keen to involve Blackbull and find out this information, specifically for Blackbull Station.

The demonstration site involved a comparison of germination, establishment and longer-term productivity of the Cunningham, Wondergraze and Redlands leucaena varieties as well as trialing different row spacings at 6m, 12m and 18m across a 47ha trial site.

Logan recognised the need to ensure that Blackbull’s soil was suitable for leucaena as the first step.

“Soil tests identified that Phosphorous, Sulphur and Calcium were satisfactory for leucaena with Potassium in the high range but still suitable” he said.

“Once we were assured that we could grow leucaena without the need for a huge amount of external inputs, we were eager to see what the potential of leucaena on Blackbull could be.”

Due to erosion concerns, no cultivation was undertaken with herbicides used for site preparation. Planting was undertaken on the 12th and 13th January 2020 with a Lightning Mechanical two row planter with a picker finger seed drill and fertiliser hopper. Fertiliser Legume Extra (Agfert) was applied at planting.

Details of the ground preparation and plant were:

<table>
<thead>
<tr>
<th>SITE PREPARATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Herbicide Application:</td>
</tr>
<tr>
<td>Active Ingredient:</td>
</tr>
<tr>
<td>Product Rate:</td>
</tr>
<tr>
<td>Application:</td>
</tr>
</tbody>
</table>
### Implement Used

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 December 2019</td>
<td>Hardy 30m boom spray. Lilac hardy mini drift nozzles</td>
</tr>
</tbody>
</table>

**Herbicide Application:**

- **Active Ingredient:** Isopropylamine salt of glyphosate
- **Product Rate:** 540g/L 2L/ha
- **Application:** Banded spray over rows

**Implement:** 700Lt 3-point linkage 2.2m boom with yellow t jet

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th January 2020</td>
<td>Wipe Out Bio Herbicide (ADAMA)</td>
</tr>
</tbody>
</table>

**Active Ingredient:** Isopropylamine salt of glyphosate

**Product Rate:** 540g/L 2L/ha

**Application:** Banded spray over rows

**Implement:** 700Lt 3-point linkage 2.2m boom with yellow t jet

### PLANTING

**Date:** 12 – 13 January 2020

**Implement (for all plantings):**

- Lightning Mechanical two row Planter (2BFY-2C) with a picker finger seed drill and fertiliser hopper.

**Variety:** Cunningham

**Total Plantings:** 10ha plus an additional 17ha outside of trial (to fill paddock)

**Row Spacing:**

- Twin rows with 60cm centres
- 10ha (trial site) at 6m row spacing
- 17ha (additional) at 7m row spacing to finish the paddock

**Rate:** 2.9 kg/ha Seed at 5cm intervals

**Depth:** 25mm

**Variety:** Rediards

**Row Spacing:**

- Twin rows with 60cm centres
- 10 ha at 12m row spacing

**Rate:** 2.9/ha Seed at 5cm intervals

**Depth:** 25mm

**Variety:** Wondergraze

**Row Spacing:**

- Twin rows with 60cm centres
- 10 ha at 18m row spacing

**Rate:** 2.9/ha Seed at 5 cm intervals

**Depth:** 25mm

**Fertiliser**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 January 2020</td>
<td>Applied at planting</td>
</tr>
</tbody>
</table>

---

**Blackbull Station**

www.leucaena.net
**Case Study**

**Fertiliser Used:** Legume Xtra AgFert  
Composition: 7% N, 14% P, 12% K + 1% zinc  
Implement Used: Fertiliser hopper on Lightning Mechanical 2 row planter.  
Product Rate: 220g/m  
Placement: Placed slightly beside and at depth of seed at planting – 2 – 5 cm.

**Herbicide**

Date: 13 January 2020 (day after planting)  
Herbicide Application: Wipe Out Bio-Herbicide ADAMA  
Active Ingredient: *Isopropylamine salt of glyphosate*  
Product Rate: 540g/L 2L/ha  
Application: Banded spray over rows

Spinnaker 700 WDG Application (BASF)  
Active Ingredient: 700 g/kg imazethapyr  
Product Rate: 140 g/ha

Implement: 1m shielded sprayer on buggy

**Pesticide**

Date: 13 January 2020 (day after planting)  
Pesticide Application: Regent 200SC (BASF)  
Active Ingredient: 200g/L Fipronil  
Product Rate: 10m/ha  
Application: targeted shield spray over rows

Implement: 1m shielded sprayer on buggy

**Germination**

% Emergence: 80%  
Resilience: 70%  
Comments: Due to heavy rains, 1% of newly established leucaena is showing signs of waterlogging – slightly off colour. A review on 29 January 2020, indicated that Wordergrahe had the highest emergence at 14spm. Other varieties were around 12spm.

Logan believes that good site preparation and aiming to get the weed seed bank down prior to planting is essential for good germination and successful early establishment.

“Our wet season provides the ideal time for establishment of leucaena here in the Territory however it brings with it the potential for a prolific amount of weed pressure on the emerging and young seedlings,” he said.

*Early Establishment Field Day*  
Blackbull Station November 2020  
www.leucaena.net
“It is constant work to stay on top of the weed pressure in those first few weeks, even with the herbicides used on the mature plants prior to planting so to plant without trying to reduce the weed pressure before you start would mean so much extra work in the long run.

“Unless you are doing all the preparation required, don’t think about planting.”

An unplanned fire ravaged the paddock three months prior to planting the demonstration site which Logan believes may have assisted with the weed control.

“I am certainly not advocating for fire to be used in pre-plant weed eradication but to look on the bright side, it may have contributed to the easier establishment by the removal of much of the trash which gave a better spray coverage,” he said.

“It’s not a planting strategy we will aim for in our future plantings!”

To combat that early weed pressure, Wipe-Out Bio-Herbicide was applied using a shielded sprayer over the top of the rows about a month after planting. An additional application of Legume Extra was broadcast over the entire paddock a week after this to provide a boost to the young seedlings and pasture between the rows.

Blackbull Station has since undertaken additional leucaena plantings with a total of 67 hectares planted and more planned within the next few years.

The initial trial site has been included into Blackbull’s grazing rotation with a live weight gain trial planned.

“We know that leucaena produces additional live weight gain but it will be good to formalise this with the documentation of actual weights and the assessment of what feed is actually available to the cattle and what they are consuming,” Logan said.

“I believe if leucaena is planted in suitable grazing areas and is managed well, it provides the Territory’s grazing industry with amazing potential.”

---

Early established leucaena on Blackbull Station November 2020

Leucaena and pasture on Blackbull Station March 2021

Blackbull Station

www.leucaena.net
6.1.2 Malilangwe

Maximising Grazing Productivity with Leucaena
Brett and Suzanne Gill
Malilangwe, Douglas Daly NT

Northern Territory graziers Brett and Suzanne Gill purchased crown lease NT portion 6071 from the NT government in late 2001 as part of the second greenfield land release in the Stray Creek land development precinct in Douglas Daly. As part of the NT government covenant requirement, they began developing the 2063 ha property and secured freehold title in 2004. They continue to work hard to transform Malilangwe into a viable and sustainable mixed grazing and cropping enterprise.

An interest in maximising Malilangwe’s grazing productivity led Brett and Suzanne to participate in The Leucaena Network’s Northern Territory Leucaena Establishment Producer Demonstration Site, a program supported by Meat and Livestock Australia, to establish trial leucaena plantings in Douglas Daly.

Brett and Suzanne’s interest in participation in the project focused on the potential improved productivity from the introduction of leucaena.

“We had been considering the introduction of leucaena to Malilangwe for quite a while so the opportunity to undertake a trial to assist in determining if leucaena would suit our grazing system was a valuable opportunity,” Brett said.
“The ability to assess on our property, the three different leucaena varieties – Cunningham, Wondergraze and Redlands, as well as determine the optimum row spacings for our soils and climate for maximum productivity, were the key drivers of our participation.”

A soil test prior to commencing the trial confirmed the Mallangwe’s soils were suitable for successful establishment of leucaena with a soil type of grey to red earth and pH of 6.2. The site will require adequate fertiliser to achieve long-term best production and growth from leucaena. An average rainfall of 1250 mm supported the decision to trial leucaena.

Brett and Suzanne commenced site preparations for the trial in March 2019 with the application of broad leaf weed herbicides across the entire paddock. This was followed by banded application of a selective herbicides across the planned row spacings prior to planting in late January 2020. Mallangwe had experienced a drier start to the 2019–2020 wet season with only 281mm rain received prior to planting, providing the opportunity to assess the potential for a ‘dry’ plant with projections of imminent increased rainfall. 10ha each of Cunningham, Wondergraze and Redlands were planted with row spacings at 7m and 14m.

Whilst 250mm in 13 falls were received in the month following planting, final germination of 40% was deemed insufficient to continue with this initial trial and the plantings were removed.

Preparations for the trial re-plant commenced in January 2021 with the 29ha trial paddock ploughed in its entirety. Roundup was applied at 3lt/ha with Pulse surfactant at 400ml/100lt across the entire paddock after weed germination. This was done using a 21.5m Hardi linkage boom sprayer with 04 air induction nozzles.

Planting was undertaken on 20 January 2021 using a Lightning Mechanical two row Planter (23FY-2C) with a picker finger seed drill and fertiliser hopper on a John Deere G150R tractor with GPS auto steering. Additional soil moisture allowed the planter to form a small hill over the top of the centre of the leucaena row which Brett believes allowed for improved germination. 7ha of each of the three varieties – Cunningham, Wondergraze and Redlands were planted with 3.5ha of each planted at 7m rows and 3.5ha at 14m rows. All leucaena was planted at a depth of 13mm and in twin rows with 750mm centres.

The fertiliser AgFert Legume Extra was applied at planting, placed slightly beside and at the depth of the seed at a rate of 77kg/ha. No insecticide was used. A light rainfall of 14mm was received on the day of planting with no detrimental effects.
Improved pasture of Jarrah grass was planted the following day in five metre strips between the seven metre leucaena rows and ten metre strips between the 14 metre rows. This spacing allowed for a buffer between the leucaena seedlings and the grass. Application of Verdict and Spinnaker selective herbicides was undertaken post plant within the first month of planting to prevent the faster growing Jarrah from impeding the successful establishment of the leucaena. The pasture planting was undertaken with a five metre Williams planter/combine with gravity feed and disc openers.

60mm rain was received in the evening following the planting of the pasture which resulted in some pasture seed displacement and some minor erosion over the paddock resulting in some small gaps in the leucaena rows. An additional 60mm rain was received in three falls within the first week of the planting of the leucaena.

Three weeks after planting the leucaena seedlings were approximately five centimetres tall with 80% germination.

The new leucaena plantings were affected by some predation by wallabies, mainly affecting rows closest to retained bush areas however the impact was not severe enough to warrant the construction of exclusion fencing. Whilst the heaviest impact from wildlife was experienced at the end of the 2021 dry season, the leucaena was well-enough established to recover well after the first wet season rains in October.

Malliangwe was able to undertake an initial light graze of the leucaena in late 2021, 11 months after establishment, with 240 two-year old heifers in the trial for 10 days. The paddock was fully incorporated into Malliangwe’s rotational grazing system over the subsequent 2021-2022 wet season.

It was noted that initially the cattle preferred the grass pasture however once they had acquainted the taste for leucaena, the cattle proceeded to feed evenly in further grazings.

Brett continues to be impressed with the speed of re-growth of the leucaena after grazing.

“We have been able to graze the trial paddock three times for about 10 days and once for a month during the current 2021-2022 wet season,” he said.

“Two of the grazes was with 240 head for ten days and one graze had 420 head of smaller one-year old cattle for ten days with about two weeks rest between grazes. We have just completed a 27-day graze of 90 male cattle on the 13th April 2022.”

At the end of wet season rainfall and leading into the beginning of the dry season, Brett believes the leucaena could handle further grazing however this will solely depend on timing of the last rainfall.
Brett and Suzanne have been able to use the trial to assess the most suitable variety and row spacing for Malliangwe's location, climate and soils.

“We have found that this area of the Northern Territory does not have significant psyllid pressure, and this has been verified by the findings of more than 20 years of trials at the Douglas Daly Research Farm,” Brett said.

“Based on this, we are leaning towards the Wondergraze variety for Malliangwe, due to its strong establishment, branching, amount of available fodder and resilience.”

The row spacing of 14 metre, 750mm twin leucaena rows was the preferred option at Malliangwe. This is due to the amount of jarrah grass required to balance with the high amount of available leucaena fodder.

“We feel we will be able to take the cattle out of the paddocks with both the leucaena and grass at similarly grazed levels at the 14m row spacings, ensuring the cattle receive sufficient nutrients from both pasture species for maximum weight gain. This is still to be confirmed though.”

Brett and Suzanne have undertaken some informal live weight gain assessments and noted that the leucaena trial paddock carried 88 head for a period of 27 days and achieved an average weight gain of 1.3kg per head per day. The lightest beast achieved a 1 kg/day average gain with the heaviest gaining an average of 1.8kg/day. The entire mob gained an average of 123kg/day. The cattle were removed following rain to enable both the leucaena and the jarrah grass to recover for further grazes prior to and into the coming dry season.

Malliangwe’s irrigated jarrah pastures have previously achieved an average 1kg per day per head live weight gain so the dryland leucaena has compared favourably.

Brett believes the improved nutrition provided by the inclusion of leucaena in the cattle’s diet is a key factor in the improved productivity.

“Whilst key determinants of increased weight gain would be each individual’s sex, age and stage of life, and we are confident that our genetic selections are a key factor in our improved productivity, the leucaena feed resource is the most important driver in realising our investment in animal genetics,” he said.

“The trial is certainly indicating that leucaena has the potential to be an important addition to our grazing system, increase our overall carrying capacity, our ability to turn off heavier cattle faster and heightened productivity of our entire cattle enterprise.”
6.2 Northern Territory Code of Practice

Preamble
Leucaena (Leucaena leucocephala subsp. glabrata), when planted with improved grass species has the capacity to provide a sustainable and profitable forage grazing system in northern Australia. Leucaena has been grown commercially across parts of Australia since the late 1970s. It is recognised that Leucaena is a valuable forage when managed properly, but it constitutes a threat to the natural environment if not contained in those areas in which it has been planted or controlled in those areas that it has invaded. This document is based on the “Code of Practice for Managing the Weed Potential of Grazed Leucaena Pastures” first developed in Queensland in 2010. It has been adapted for Northern Territory conditions.

Weed Potential
If Leucaena is ungrazed or unmanaged there is potential to form dense thickets over time. The current environmental impacts come from both ungrazed ‘common’ Leucaena (L. leucocephala subsp. leucocephala) and commercial cultivars of the subspecies L. leucocephala subsp. glabrata. Mature plants in these situations can produce a quantity of seed which has a dormancy period (that can be many years) before germination occurs. Leucaena seed can be unintentionally spread multiple ways including via wind, birds, grazing animals, and water flow if near waterways. Leucaena seed has the potential to stay viable in the soil for many years and if established in dense thickets, can be difficult and time-consuming to eradicate.

Common Leucaena
The common Leucaena (L. leucocephala subsp. leucocephala) has been naturalised in coastal and urban areas of northern Australia for more than 100 years, long before the release of commercial cultivars for grazing. In the Northern Territory, Leucaena is commonly referred to as Coffee Bush and is typically found in peri-urban, disturbed, and roadside areas.

Cultivated Leucaena
It must be noted that commercial cultivars of the subspecies L. leucocephala subsp. glabrata are managed on-farm for productive purposes. Nevertheless, where unmanaged it also has a similar weed potential to the common Leucaena. The Leucaena Network actively promotes this Code of Practice for responsible management of commercial Leucaena varieties.

Commercial Leucaena pastures must not be allowed to contribute to a weed problem beyond the extent of the Leucaena plantation or property boundary.
Commercial Benefits
Leucaena presents an opportunity for Northern Territory beef producers to diversify their grazing operations. Once Leucaena is established, it can be used to significantly improve animal productivity compared to unimproved native pastures, mainly through superior live weight gains for the breeding herd and for finishing steers. Grazing trails in established Leucaena areas have demonstrated at least 50 kg/ha/year live weight gain benefit for Leucaena over grass only pastures. Preliminary desktop analysis for the Katherine and Victoria River District indicates an increase in gross margin per steer of approximately $150 when Leucaena is used.

Environmental Benefits
The effects of Leucaena-finishing of cattle on greenhouse gas emissions, production, and profitability at the whole farm level have also been modelled using the Beef Greenhouse Accounting Framework. Finishing steers on Leucaena has been shown to effectively increase animals carried and live-weight turnover by 15% and 31%, respectively, compared to grass pastures. The National Livestock Methane Program determined that average methane output (g/kg live weight gain) was 28% less on Leucaena – grass pastures compared to grass (Rhodes) only pastures.

In addition, Leucaena enhances nitrogen (N) supply to the soil which improves grass growth and groundcover, and enhances soil reserves of organic matter which in turn stimulates soil biological activity and improves the soil structure.

Recommendations for Producers
In order to promote the sustainable and long-term economic benefits of Leucaena, it is essential that the risks of weed spread are mitigated by the adoption of the Code of Practice (NT) by all landowners who have Leucaena planted on their properties.

The Leucaena Code of Practice (NT) is actively promoted by The Leucaena Network in the Northern Territory and provides clear guidelines to minimize the environmental risk of unmanaged Leucaena in regional and rural areas.

The use of Leucaena for any purpose other than as a highly managed and well contained forage crop for animal production is not supported by industry bodies and Government agencies and should be discouraged.

Aims of the Code
- Limit the unplanned spread of Leucaena through responsible planting strategies
- Minimise seed set in grazed stands
- Minimise the risk of seed dispersal
- Control escaped plants from grazed stands
NT LEUCAENA CODE OF PRACTICE PRINCIPLES

Plant Leucaena ONLY if you intend to manage it and are prepared to accept responsibility to control Leucaena that establishes outside the planted area on your property. Under this Code of Practice, it is necessary to implement ALL the following management practices in order to mitigate the risk of Leucaena spreading from planted areas.

a) Fully fence Leucaena plantations to manage grazing operations and avoid the risk of stock spreading seed.

b) Maintain a Leucaena-free minimum separation distance between Leucaena plantation fencing and the property boundary, in accordance with corresponding property boundary buffer widths recommended in the Northern Territory Planning Scheme Land Clearing Guidelines [NTPS Guidelines] (see Table 1).

Table 1 - Minimum separation distance between property boundary and Leucaena fencing

<table>
<thead>
<tr>
<th>Property size (ha)</th>
<th>Minimum distance from property boundary to Leucaena fence (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;8</td>
<td>25</td>
</tr>
<tr>
<td>8 to 20</td>
<td>50</td>
</tr>
<tr>
<td>20 to 100</td>
<td>100</td>
</tr>
<tr>
<td>&gt;100</td>
<td>200</td>
</tr>
</tbody>
</table>

c) Maintain a Leucaena-free minimum separation distance of 250 m between Leucaena plantation fencing and the boundary of NT and Commonwealth National Parks, Conservation Reserves, and private Conservation Reserves.

d) Only plant Leucaena in areas where rivers, creeks, floodways and other sensitive drainage features cannot disperse or collect seed. Maintain a minimum Leucaena-free separation distance between Leucaena plantation fences and the outer edge of the features described in Table 2.

Stream order can be determined from a topographic map of an appropriate scale (generally 1:100,000 or 1:50,000) (see Figure 1). A stream order spatial dataset is also available on NR Maps [https://nrmmaps.nt.gov.au/nrmmaps.html]. Use this dataset as a guide only and field verify the location of riparian areas prior to planting.

e) Establish and maintain a minimum 10m wide Leucaena-free buffer of vigorous grass-pasture between Leucaena plantation fences and Leucaena plantations.
**Figure 1** – Stream orders (NTG, 2019).

**Table 2** – Minimum separation distances between Leucaena plantation fencing and drainage features (adapted from the NTFS Guidelines)

<table>
<thead>
<tr>
<th>Drainage feature</th>
<th>Stream Order</th>
<th>Minimum separation distance (m)</th>
<th>Measured from (see Appendix 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage depression</td>
<td>Not applicable</td>
<td>100</td>
<td>The outer edge of the drainage depression, which is the extent of the associated poorly drained soils and associated vegetation</td>
</tr>
<tr>
<td>Intermittent Streams and Creeks</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;, 2&lt;sup&gt;nd&lt;/sup&gt;, 3&lt;sup&gt;rd&lt;/sup&gt;, and 4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>100</td>
<td>The outer edge of the riparian vegetation or levee (whichever is the greater). If braided channels are present, the edge of the outer-most stream channel.</td>
</tr>
<tr>
<td>Rivers</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; or higher</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Low/Medium Value Wetlands and Groundwater Dependent Ecosystems</td>
<td>Not applicable</td>
<td>100</td>
<td>The outer edge of areas that are dominated by plants adapted to seasonally saturated and/or inundated conditions</td>
</tr>
<tr>
<td>High Value Wetlands and Groundwater Dependent Ecosystems</td>
<td>Not applicable</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Sinkholes</td>
<td>Not applicable</td>
<td>100</td>
<td>The outer edge of the sinkhole perimeter.</td>
</tr>
</tbody>
</table>
f) Establish and maintain vigorous grass pasture in the Leucaena plantation inter-rows to:

- provide competition to minimise establishment of volunteer Leucaena seedlings
- minimise the risk of seed being transported during heavy rain events
- productively utilize fixed nitrogen that the legume-based system produces
- maintain groundcover and prevent soil erosion.

g) Graze or cut Leucaena to a height of less than 3 m to keep it within the reach of cattle and to minimise flowering and seed set.

h) Monitor for Leucaena spread by regularly inspecting buffer zones, drainage areas, watercourses and property boundaries to detect and control Leucaena seedlings and plants. Control Leucaena plants found within buffer zones or outside of paddock or property boundaries. Chemical control is recommended in these areas. Refer to the Northern Territory Weed Management Handbook for recommended chemicals www.nt.gov.au/weeds.

i) Report the location and control of any Leucaena plants that have escaped from dedicated grazing paddocks to areas outside Leucaena plantation fencing to the Northern Territory Weeds Management Branch of the Department of Environment, Parks and Water Security (DEPWS) on (08) 8999 4567 or email weedinfo@nt.gov.au.

j) Register Leucaena plantations with The Leucaena Network

k) Promote the responsible management of Leucaena in accordance with this Code including communicating the requirements of the Code to new managers and/or owners of the property.

l) Keep abreast of developments in best management practices for Leucaena and adaptively manage related operations according to any changes or developments.

m) Remove any Leucaena plantations on your property that you do not intend to manage in accordance with the requirements of this Code.

The Northern Territory Leucaena Best Management Code of Practice was developed in consultation with the Department of Environment, Parks and Water Security and Northern Territory grazing representatives. The following organisations endorse the adoption of the Code of Practice to maintain a sustainable and profitable beef industry using Leucaena pastures:

- NT Department of Industry, Tourism, and Trade
- NT Farmers
- Northern Territory Cattlemen’s Association

NT Leucaena Best Management Code of Practice www.leucaena.net
Appendix 1. Examples to assist interpreting the NT Leucaena Code of Practice in relation to NT Land Clearing Guidelines

Example Scenario 1:

Typical example for pastoral lease or unzoned freehold property where new clearing of native vegetation in accordance with an approved permit will be required in order to establish a Leucaena plantation.

- Property is >100 ha and cadastral (property boundary) is fenced.
- Area surrounding Leucaena plantation is characterised by native vegetation and has not previously been cleared.
- A land clearing permit has been approved for the Leucaena plantation under the relevant legislation.
- As per the Code and in accordance with the NT PES Land Clearing Guidelines, a native vegetation buffer with a minimum width of 210 m (including a 10 m wide firebreak) has been retained along the cadastral boundary.
- As per the Code, the Leucaena plantation has been fenced. The property boundary fence line acts as part of the Leucaena plantation fence line; and as per the Code, a (minimum) 10m wide Leucaena-free grass buffer has been retained adjacent to the Leucaena plantation. The total distance from the cadastral boundary to the external edge of the Leucaena plantation is a minimum of 220 m.
Example Scenario 2.

Typical example for pastoral lease or unzoned freehold property where clearing of native vegetation has previously occurred and has been maintained free of native vegetation to date.

- Property is >100 ha and cadastre (property boundary) is fenced.
- Native vegetation has previously been cleared within the property, to the cadastral boundary.
- Note: Before planting Leucaena, contact DEPIWS for advice regarding whether a new clearing permit or variation to an existing permit is required.
- As per the Code, a minimum separation distance of 200 m (including a 10 m wide firebreak) has been retained along the cadastral boundary.
- The property boundary fence line acts as the Leucaena plantation fence line; and as per the Code, a (minimum) 10m wide Leucaena-free grass buffer has been retained inside the fence line.
- The total distance from the cadastral boundary to the external edge of the Leucaena plantation is a minimum of 200 m.
Example Scenario 3:

Typical example for pastoral lease or unzoned freehold property.

- Leucaena plantation is within proximity of a second order stream.
- A land clearing permit has been approved for the Leucaena plantation under the relevant legislation.
- The NTG Land Clearing Guidelines requires a native vegetation buffer with a minimum width of 50 m to be retained along second order streams, from the outer edge of the riparian vegetation.
- As per the Code, a 100 m wide native vegetation buffer has been retained from the outer edge of the riparian vegetation to the Leucaena plantation fence line.
- As per the Code, a 10 m wide Leucaena-free grass buffer has been retained between the Leucaena plantation fence line and the external edge of the Leucaena plantation.

References

NT Leucaena Best Management Code of Practice www.leucaena.net