

# final report

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## MLA Regional Trials – Tasmania Cressy Site

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### **Executive Summary**

The Pasture Variety Trial Network (PTVN) was established through the MLA Feedbase Investment Program. It was initiated in response to requests from stakeholders, particularly producers, for coordinated pasture cultivar evaluation.

The Tasmanian site at the Cressy Research Station (CRS) was one of the independent trial sites supported across Southern Australia by MLA, and was the only site in Tasmania. The Cressy site was selected as it represented a region and rainfall that would provide the best indicative results of pasture cultivar performance for most of Tasmania's grazing regions.

Five trials were established evaluating Perennial Ryegrass, Tall Fescue, Phalaris, Cocksfoot, and Lucerne. Two trials, Lucerne and Phalaris, required re-sowing. Data was submitted for up to three years as required, and the trials were conducted in accord with the PVTN trial protocols. Data was submitted for inclusion in the national database, and the development of a web based decision support tool for cultivar selection.

Key outcomes from the trial are, firstly, the continuation of the PVTN concept through the new Pasture Trial Network (PTN) being managed by the Australian Seeds Federation (ASF), and, secondly the coordinated release of the data generated to producers through the development of the web based decision support tool. The PTN has been established with support of ASF members, with seed companies being investor's in future independent trials.

Producers (and advisors) will continually have access to cultivar performance information via the web based tool, and the continuation of cultivar testing through the PTN. This information can be used as part of the pasture re-sowing decision making process, and will ensure that producers can select superior pasture cultivars and therefore capture the value of superior pasture genetics currently available.

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### 1 Background

#### 1.1 Project Rationale

The PVTN was initiated by MLA as part of a regional MLA trial program to provide MLA, producers and other stakeholders with performance information of a range pasture species. A number of sites were established across Southern Australia, including the Tasmanian site at which comparative cultivar performance was evaluated.

The independent trials were considered a part of the verification process for the seed company trials being entered into the PVTN. The data from both these and related company trials will be used to create larger data sets to evaluate comparative cultivar performance within and across target regions.

The Cressy site was established to deliver data to the PVTN from 5 small plot trials covering five pasture species.

### 2 **Projective Objectives**

#### 2.1 By 30 May 2015:

- 2.1.1 To have established 5 small plot trials as negotiated with MLA.
- 2.1.2 Managed and reported information according to required protocols as part of the Pasture Variety Trial Network (PVTN).
- 2.1.3 From the trials deliver statistically sound data capable of showing significant differences between cultivars within a species as a guide a CV of 15% or better is required.
- 2.1.4 Maintain operator and site accreditation.

### 3 Methodology

## 3.1 Locate trial sites within the regions defined by MLA – and gain agreement for site before preparing to sow the site.

The site selected was at the Cressy Research Station (CRS), approximately 40 kilometres south of Launceston. The site receives approximately 626mm average annual rainfall, and is located in Tasmania's Northern Midlands, composed of predominately mixed farming enterprises.

The field trials established by TIA at the CRS were located adjacent to other pasture R&D field trials to raise the profile of the project by increasing its visibility when other pastures events were held at the Cressy site. The site was agreed with MLA.

## 3.2 Secure and prepare trial site in accordance with the protocols. This means fencing at all times and no inadvertent animal grazing and data loss.

The co-located trial sites (five in total) were all individually fenced to a standard of holding adult sheep. Temporary water troughs were installed. One plot was lost from the Winter Lucerne trial due to sheep trampling following a significant rainfall event in mid-Spring 2013.

The establishment phase of all the trials was difficult. This is no different to any pasture establishment activity; the greatest risk to any pasture is in the establishment phase. For up to the first 12 months weeds were problematic before they were satisfactorily controlled. This could have been alleviated if sites were negotiated and agreed earlier allowing for a longer preparation period and earlier sowing time.

# 3.3 Source of trial seed (in line with protocols) – however subject to final approval of entries by the nominated program manager. (Please consult with MLA Regional Trial manager before proceeding).

Trial seed was secured through the MLA Regional Trial manager. Seed that could be secured locally in Tasmania was by agreement with the manager. All seed imported to Tasmania was subject to biosecurity compliance which for most lines was based on visual inspection by quarantine officers.

Perennial ryegrass imported into Tasmania required certification of freedom from ryegrass nematode (*Anguina sp.*), which was undertaken in Tasmania by quarantine services prior to releasing of seed to TIA.

# 3.4 Sow perennial grass and legume trials in autumn of 2012. Species and number as follows: Perennial Ryegrass – 30, Tall Fescue – 12, Phalaris – 12, Cocksfoot – 12, and Lucerne – 20.

All trials were sown in on the June 4<sup>th</sup> 2012. All trials were a randomised complete block design with four replicates. Plots were 1.5m x 6m. The Lucerne trial was split into two trials representing the winter active and winter dormant classes of Lucerne. A common cultivar, SARDI 7, was sown in each Lucerne trial.

The number of trial entries were as follows: Perennial Ryegrass -30, Tall Fescue -11, Phalaris -11, Cocksfoot -13, and Winter Active Lucerne -13, and Winter Dormant Lucerne -7.

The initial Lucerne and phalaris trial sowings failed. The Lucerne trials were re-established on the 2<sup>nd</sup> November 2012, and irrigated during summer to ensure trial success.

The phalaris was re-established in 28<sup>th</sup> October 2013. Advice from the program coordinator was for the trial to be abandoned. TIA sourced its own supply of seed, re-sowed, and the trial was subsequently included in the program. The re-inclusion of the phalaris trial was based on the favourable trial audit report conducted in 2013.

# 3.5 Register both operators and trials in the PVTN and maintenance of registration status is required.

Registration for Brian Field as trial manager and Rowan Smith as trial coordinator was submitted and maintained.

# 3.6 Ensure all methods and trials are, as a minimum, compliant with the standards of the PVTN and undertake all work necessary to submit these trials to this program.

All methods and trials were compliant with the program, as evidenced by the trial audit reports. On occasions remedial action was required for some trials to maintain compliance, which was undertaken successfully. Weed control was the major issue requiring remedial action.

## 3.7 Provide on-going management and monitoring services to these trials – based on the protocols.

All activities undertaken were in compliance with the protocols. This included harvest methodology, post-harvest management including sheep grazing, fertiliser applications and weed control. Trial management activity logs, including details for activities such as fertiliser management, herbicide applications and grazing with livestock, were submitted to MLA.

# 3.8 Submit all data to the PVTN in an electronic format – this is expected to occur directly into the PVTN nominated database system. Data to be submitted on a 6 monthly basis as a minimum (and in line with the milestones) and maintenance of data confidentiality as required by MLA.

Data was submitted in an electronic format as required to MLA or their representative. Submitting data in line with milestones was not always achievable as trial harvest schedules overlapped with milestone reporting timelines. However, as soon as data was available it was forwarded.

Data was stored on a secure server and only accessible to authorised personnel. TIA staff did not undertake any analysis of the data collected.

3.9 Data to be submitted includes Dry Matter measurements (for a minimum of 3 years – as per contract), botanical composition (if necessary), plant count and persistence measurements (persistence to be measured each year and for the duration of the contract), scoring of any pest or disease damage, endophyte infection rates (ryegrass and tall fescue).

Dry matter – data submitted for all trials.

Botanical composition – data included in some submitted data sets. Through using a frame harvest method samples were hand separated in the laboratory to determine target species composition percentage of the whole sample.

Plant count and persistence measurements – Plant count data was submitted, however data for persistence measures were not submitted. At the conclusion of the project persistence measures will be undertaken and submitted. Annual persistence measures were not undertaken as there was ambiguity of the requirement for such annual data submission and requirement.

Pest or disease damage – None to report, however preventative applications of slug bait was undertaken during the reestablishment of the phalaris trial.

Endophyte infection rates – Endophyte testing for perennial ryegrass and tall fescue was undertaken in May 2013 and results submitted as required.

# 3.10 Maintain a secure, neat and tidy trial site and make it available for any inspections required by the PVTN, MLA or its nominated representatives, plus be available for MLA approved field days or site inspections.

The trials were securely and well maintained. No inadvertent grazing by livestock occurred.

The site was freely available for PVTN inspections, including three audit inspections, and by agreement, available for field days. As the site was located near other pasture and cropping R&D field sites, at each field day event not related to the PVTN the trials were discussed and promoted to create awareness of the trial network. At other field days, the trials were discussed in more detail, however results were never released.

## 3.11 At the conclusion of the trial, subject to approval from MLA, remove the trial and return the trial to its former status.

This has not yet been negotiated.

3.12 As far as possible design and locate the trial so that grazing of the trial could be incorporated as a separate and additional activity after the full three year term of the contract has expired and it has been decided by MLA that it is necessary.

The design and location would enable further utilisation of the trials for further activity. All the trials are separately fenced with access to livestock water, and sheep for grazing are readily available.

#### 3.13 It is accepted that the location of the trials in more marginal regions may mean that some cultivars may not perform well or persist for the duration of the trial. If a trial fails completely then the next action (re-sowing or renegotiation of the contract) will be negotiated with the MLA Regional Trial Coordinator.

The Lucerne and Phalaris trials failed following the first sowing. This was not due to poor adaption of the species and cultivars to the environment, rather incorrect sowing time for those species. Late autumn/early winter sowing in Tasmania of slow to establish species is undesirable as the plants do not accumulate sufficient growth, especially in cold damp winter conditions, to be competitive with winter germinating weeds.

The tall fescue and cocksfoot trials were also slow to establish, as reflected in the long time period between sowing and establishment and the first dry matter harvest.

As reported in 3.4 above, the Lucerne and phalaris trials were re-sown.

# 3.14 Should evaluation of seed company breeding lines be progressed at the site, then confidentiality and seed security arrangements will need to be implemented. This will be determined by the MLA Regional Trial Manager.

TIA has negotiated to participate in the new PTN, which replaces the PVTN. All arrangements have been undertaken with the PTN management.

# 3.15 MLA requires that strict control of all seed is maintained and that no seed supplied for use in this program is used for any other purpose unless directed by the MLA Regional Trial Manager.

All seed supplied was used for sowing, or kept for 12 months then destroyed.

## 3.16 The operator will maintain all trial data on a confidential basis and any use of data will require prior permission from the MLA Trial Manager.

All the data has been stored electronically on the TIA server and has not been utilised or released by TIA for any purpose other than for the MLA PVTN.

#### 3.17 Identify and take advantage of opportunities to showcase the trial site and any publishable data – with prior agreement from MLA. Data summaries will be provided by the PVTN for this purpose as and when they are available.

The trials were showcased at numerous field inspections and field days. The locating of the trials at the Cressy Research Station embedded the trials with a range of pasture and cropping trials including a gazing study, a high input forage evaluation, and a range of cereal (including dual purpose) and forage field trials. This increased the exposure of the PVTN field trials at field days for the other activities.

The audiences interacting with the site included producers, advisors, government, students, and seed company representatives. A number of private agronomists were made aware of the PVTN, and the new PTN, through personalised inspection days highlighting some of the pasture related RD&E conducted by TIA.

Over 300 people visited the site over the life of the program. Over 80 producers and stakeholders have visited the trials site since October 2014. This included the North East Farmers Discussion Group (25), the Tasmanian Pasture Seed Conference field tour (57), and up to five site inspections with up to five attendees.

An MLA supplied factsheet was used to promote the PVTN after September 2014.

### 4 Results

#### 4.1 Dry Matter Harvests Events

4.1.1 Perennial Ryegrass

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012										1	1	
2013					1		1		1	1	1	1
2014	1			1		1		1		1		1

2015		1			1						
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#### 4.1.2 Tall Fescue

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012											1	
2013					1			1	1	1	1	
2014	1			1			1	1		1	1	
2015		1			1							

#### 4.1.3 Cocksfoot

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012											1	
2013					1			1	1	1	1	
2014	1	1		1		1		1		1	1	
2015		1			1							

#### 4.1.4 Phalaris

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012												
2013												
2014						1		1		1	1	
2015				1		1						

#### 4.1.5 Winter Active Lucerne

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012												
2013					1		1		1		1	1
2014		1			1		1			1	1	
2015	1	1			1							

#### 4.1.6 Winter Dormant Lucerne

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012												
2013					1				1		1	1
2014		1			1		1			1	1	1
2015		1			1							

#### 4.2 Botanical composition

Botanical composition data was not supplied, however as a cut and carry dry matter harvest methodology using frames was undertaken, hand separations were conducted prior to drying the samples to determine the percentage of target species in each sample. This data would be available if required.

#### 4.3 Plant counts and persistence measures

Plant counts were conducted following emergence of the sown trials, and submitted to MLA. Persistence measures are to be completed and will be forwarded upon completion.

#### 4.4 Endophyte infection rates

- 4.4.1 Perennial Ryegrass results submitted in 2013.
- 4.4.2 Tall Fescue results submitted in 2013.

### 5 Discussion

#### 5.1 Relevance of research undertaken

Public pasture plant cultivar testing is undertaken as a service to producers to create data sets of comparative pasture plant performance. The data generated can assist producers make informed cultivar choices when re-sowing new pastures. By inference, seed suppliers of superior cultivars benefit through the inclusion of cultivar performance data with pasture mix recommendations.

The project has assisted in providing data to a national database and delivery system for pasture cultivar performance. However, persistence measures in the life of this project could be considered to be within a narrow timeframe. A longer period to measure persistence would increase the relevance of the data, especially as many pasture re-sowings in Tasmania are for pasture life expectancies of over 5 years.

Cultivars are being sold into farming systems of variable rainfall, uses (set stocking to intensive rotational grazing), irrigation, fertility, and rotation. Therefore, the information generated may be released in the context of further information and wider pasture based research that has been undertaken.

#### 5.2 Industry implications

The results of the project undertaken should contribute to both the producer and the seed supplier sectors. Producers will have confidence that cultivars have been independently evaluated, while seed suppliers will have supporting information that their cultivars have been evaluated through an independent scheme.

Pasture cultivar development is expensive, and with the majority of pasture development occurring in the private sector. The protection of cultivars with Plant Breeders Rights is reward for investment in the development, and secures an income stream to continue that development process.

Measures of livestock production gain from improved cultivars is often subjective, and only realised when managed appropriately in a farming system, however the continual process of capturing value from cultivar improvement is on-going. Increased dry matter production from new cultivars in new pasture sowings is one aspect of capturing increased or more efficient livestock production.

#### 5.3 Additional research

The project was a significant investment by both MLA, and its delivery partners. The continuation of cultivar evaluation through the PTN for comparative cultivar testing, that producers and most industry sectors consider valuable, will continue the legacy of the PVTN for comparative cultivar testing.

Opportunities for continuing to realise value from this specific investment could be explored, especially in relation to monitoring for pasture cultivar persistence. TIA would like to explore the opportunity for maintaining and grazing the trials for two to three years with on-going persistence monitoring. This could be used to evaluate development of a production by persistence ratio for pasture cultivars.

#### 5.4 Extension

Showcasing the trials and the PVTN commissioned by MLA was conducted extensively throughout the life of the trials. TIA was able to maintain a high awareness of the activity through co-locating the trials with other pasture and cropping field projects. As discussed earlier, a number of field days and group inspections to the site were conducted and the PVTN trials were able to be incorporated into those events. The field days often included presentations and discussion in an adjacent shearing shed. This proved especially effective with groups of less than 20, where more targeted discussions of many pasture issues could be undertaken with stakeholders.

The targeting of hosting service providers and private agronomists visits to the site has been beneficial for the project. All visitors expressed a sentiment that they "want to see the results". Agreement was reached that they will be informed of the release of the website. A field day is planned at the site in early spring at which an intensively managed irrigation project will be highlighted, along results from a grazing trial, and presentation of the PVTN website. The theme for the event will be based on decision making considerations for pasture renovation.

#### 5.5 **Project improvements**

The cultivar trials generated continous comparative performance data so no improvements could be made to the project as it was undertaken.

However, some management improvements could be made. Local knowledge should be considered especially in relation to agronomic decisions. While being a component of a national project, the timing of sowing created significant problems. Late sowing (late autumn and early winter) and therefore slow establishment in this project created problems with managing competitive winter germinating weeds. As a result the Lucerne and phalaris trials failed and required re-sowing.

Linking projects such as this being reported with other RD&E can more efficiently capture new knowledge. This has been achieved with the new 2015 PTN site being conducted by TIA in North West Tasmania near Burnie. Dairy Australia investment has been partnered with the PTN site to facilitate feed quality testing. While the feed quality testing is focussed on dairy, it will capture greater value from the sown trial and have relevance for meat producers.

#### 5.6 **Project objectives**

5.6.1 To have established 5 small plot trials as negotiated with MLA.

The five plot trials were established from which data was collected for three years. Two trials were re-sown, the Lucerne in late 2012 and the phalaris in 2013. The two trials have not contributed data over the expected three year term of the project. Therefore the project objective was not fully achieved on two of the five plot trials.

5.6.2 Managed and reported information according to required protocols as part of the Pasture Variety Trial Network (PVTN).

The projects were managed and reported according to the required protocols as part of the PVTN. The persistence measures are still to be finalised and submitted. This delay has occurred due to the late final dry matter harvests and subsequent slow recovery of the sown plots that will enable identification of sown species.

Further, full management activity logs have been supplied to the PVTN manager. Audit results were responded to as requested with corrective actions undertaken. There were at times ambiguity of the requirements for the data to be collected.

5.6.3 From the trials deliver statistically sound data capable of showing significant differences between cultivars within a species – as a guide a CV of 15% or better is required.

The statistical integrity of the data generated from the trials was never reported. TIA could have undertaken analysis of the trial data independently if permitted to check data integrity for the purpose of ensuring a CV of 15% or better was achieved.

#### 5.6.4 Maintain operator and site accreditation.

Both operator and site accreditation was maintained for the five trials once the trials established satisfactorily. This was supported by the continued favourable reporting of trial audit results. While some remedial actions were required to maintain compliance and therefore accreditation, it was a mechanism to demonstrate the trials were being successfully managed.

Site accreditation assisted ensuring the trials can be reported as successfully conducted. It also provided a mechanism for reporting to trial operators that the trials were being conducted in a manner that the data being generated could be included in the development of a decision support tool targeting producers.

### 6 Conclusions/Recommendations

#### 6.1 PVTN to PTN Legacy

The independent trial sites established across Southern Australia in 2012 have supported establishment of an industry driven PTN. Producers and other stakeholders often express a desire for comparative testing of pasture cultivars, and this activity has supported an industry lead approach for the continuation of that activity. All beneficiaries of this type of work are now stakeholders in delivering such R & D.

#### 6.2 Future Site Use

The Tasmanian PVTN site is available and can be utilised for longer term persistence monitoring of the cultivars sown. No new infrastructure is required. A three year grazing and monitoring program is recommended to determine if a "production x persistence" ratio can be developed. This could include feed quality testing to confirm that degraded pasture swards are generally of lower feed quality for the grazing animal.

#### 6.3 Decision Support Tool

The data being collated, analysed from the PVTN and reported through the web based decision support tool requires promotion for use and therefore uptake by producers. However, the tool should not be considered as a standalone source of information for making pasture re-sowing decisions, and requires presentation in that context. It is recommended that extension activities promoting the web tool are done against a background of the wider information available for pasture re-sowing and cultivar selection decisions.

### 7 Key Messages

The trials were conducted successfully in accord with the protocols specified by MLA in the Pasture Trials Protocol manual. All data has been submitted for inclusion in the national database from which a web based decision support tool will be generated.

The Cressy trials will contribute to the overall knowledge of the adaption and performance of a range of pasture cultivars available to producers. Pasture re-sowing is often a long term investment. Knowledge of the superior performance of improved cultivars will assist producers establish pastures with superior cultivars. This is particularly relevant in the region that the Tasmanian trials were conducted. The 2011 Tasmanian Pasture Survey illustrated that over half of the pasture base is dominated by inferior species.

Participating seed companies cultivars have been evaluated under a controlled, standardised, and independent testing regime. Through the continuation of this activity by the PTN, seed companies will have access to a program that independently evaluates and confirms the advantages of using superior genetics incorporated into pasture cultivars.