Pasture Seeds Program
Five Year Plan
2013-18

JUNE 2014
RIRDC Publication No. 14/053
## Contents

What is a Five Year Plan? ............................................................................................................. 4

The Pasture Seeds Industry ......................................................................................................... 5

- Industry profile ..................................................................................................................... 5
- Industry position in the RIRDC life cycle .............................................................................. 5
- Financial commitments ......................................................................................................... 6


- Five Year R&D Plan 2008-2013: Review summary ............................................................... 7
- Key Outcomes for producers from the 2008-2013 5 Year Plan R&D .................................... 8
- Pasture seeds industry RD&E objectives, 2014-2019 ........................................................... 9
- Enabling Objective: Improved alignment between industry objectives and research and development outcomes ................................................................. 10
- Objective 1: Focus on growth of domestic and export pasture seeds markets .................. 11
- Objective 2: Improved industry capacity through skills and leadership training ............... 12
- Objective 3: Production and processing efficiency and improved sustainability ............... 13
- Objective 4: Improved industry knowledge with data, extension and communication ........ 15

Glossary ......................................................................................................................................... 16

References .................................................................................................................................. 17

Appendix 1 Alignment of Program objectives with Government and RIRDC priorities .......... 19

Appendix 2: Industry Analysis ................................................................................................... 20

Appendix 3: Consultation Feedback ............................................................................................ 41

Appendix 4: Program Review ....................................................................................................... 48

Appendix 5: SWOT Analysis ....................................................................................................... 54

Appendix 6: Future Funding Scenarios ......................................................................................... 58

Appendix 7: Plan on a Page .......................................................................................................... 62
What is a Five Year Plan?

This Five Year Plan has been developed by RIRDC, in consultation with industry stakeholders, to outline the Pasture Seeds industry’s research, development and extension (RD&E) objectives until 2018. These objectives have been shaped by the goals and strategies of the RIRDC Corporate Plan 2012-2017 (RIRDC 2012). The Corporate Plan is available on the RIRDC website, www.rirdc.gov.au/about-rirdc.

Pasture Seeds Program Five Year Plan 2013-18 alignment with the RIRDC Corporate Plan and Australian Government strategic and rural research priorities is summarised in Appendix 1.
The Pasture Seeds Industry

Industry profile

The RIRDC Pasture Seeds RD&E Program is concerned with certified temperate pasture legumes. Certified seed is planting seed which has been produced and processed to meet the requirements of a quality scheme. Temperate pasture species include medics, lucerne, serradella, sub-clover and clover. Annual production of seed from these species has been estimated at 20,600 tonnes excluding farmer-to-farmer seed sales. Annual production of certified temperate pasture seed has been estimated at 8,500 tonnes (Hudson 2013 using a combination of survey and Australian Seed Authority data – see Appendix 2).

There are approximately 500 growers of temperate pasture seed in Australia. The grower base can be bifurcated into long-term ‘professional’ seed growers who produce certified seeds for commercial seed companies and short term ‘opportunistic’ seed growers who may supply the seed trade or sell directly to other farmers. Total pasture seeds industry Gross Value of Production (GVP) was estimated at $107 million in 2013 with leviable crops valued at $36 million. More than 70% of total industry GVP was generated in export markets. Pasture seed exports were dominated by sales of certified lucerne seed to Saudi Arabia. Other important export markets include Argentina, the US, China and Italy. New Zealand, the US and South America are the largest suppliers of pasture seed imports. Seed species imported include ryegrass, tall fescue and clover. Domestic pasture seed sales are dominated by sub-clover and lucerne (Hudson 2013 – see Appendix 2).

The temperate pasture seeds industry has been regarded as mature with no growth in production or GVP recorded between 2008 and 2013. Growth in the pasture seeds industry has been constrained by macro and micro factors including widespread drought, a lack of confidence in the persistence of sown pastures and the relative profitability of cropping compared to livestock production. There has also been a shift to lower cost and lower quality uncertified seed at the expense of certified temperate legumes (Hudson 2013 – see Appendix 2).

The importance of this industry to Australia lies in its contribution to the productivity of other agricultural sectors. Certified temperate pasture seed contributes to the productivity of pasture based livestock industries including beef, sheep and dairy. Sown pastures provide break crop benefits to the grains industry and temperate pastures provide cut fodder for the dairy and equine industries together with export fodder sales. Over the life of this Plan the number of livestock grown on improved pastures in southern Australia is forecast to increase by more than one million head while the area of improved pasture sown is forecast to increase by 20% to 21 million ha. In addition the Australian dollar is expected to weaken against the US dollar over the period 2014 to 2019, potentially boosting export demand for certified pasture seeds (MLA 2012, ABARES 2014).

The outlook for certified temperate pasture legumes over the life of this plan is for growth.

Program public good outcomes delivered from RIRDC’s investment in temperate pasture seeds RD&E have included increased scientific and industry capacity as well as measures to decrease the pasture seed industry’s demand for water and its environmental impact, especially during harvest.

Industry position in the RIRDC life cycle

RIRDC’s commitment to rural industries is to support appropriate RD&E given their stage of maturity in the Australian market. RIRDC clearly defines its role as an investor in industries based on their development stage and the unique attributes of each specific industry. Much of RIRDC’s portfolio is in the new, developing or maturing phase of industry development.

Unlike much of the RIRDC portfolio, the pasture seeds industry is an established, mature rural industry. It has a levy arrangement in place to support RD&E. The industry chooses to operate its RD&E Program within RIRDC as this arrangement delivers a number of benefits, including an industry specific focus and a
range of administrative efficiencies. The position of the pasture seeds industry in the RIRDC life cycle is shown in the table below.

<table>
<thead>
<tr>
<th>Pasture Seeds Industry Development Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
</tr>
<tr>
<td>Developing 1</td>
</tr>
<tr>
<td>Developing 2</td>
</tr>
<tr>
<td>Maturing</td>
</tr>
<tr>
<td>Established</td>
</tr>
</tbody>
</table>

The pasture seeds industry is committed to ongoing improvement and growth, and to support the RD&E necessary to achieve this. The industry is represented by a number of organisations whose support will be important to delivering the aims of the Plan. Industry representation is provided by Grain Producers of Australia –Seed Industry Committee; the Australian Seed Federation; Lucerne Australia; South East Seed Growers Group (of the Victorian Farmers Federation); Grasslands Society of Southern Australia; and Mackillop Irrigation Management Group (formerly White Clover Growers Association).

**Financial commitments**

The RIRDC Pasture Seeds RD&E Program is supported by a statutory levy on certified seed sales in both domestic and export markets. The levy is currently struck at between $10/tonne and $15/tonne depending on the category of seed being certified.

Industry levies are matched by the Australian Government. The pasture seed industry has made an annual average contribution to the RIRDC Pasture Seeds Program of approximately $130,000 over the period 2008 – 2013. Over the same period Commonwealth Contributions averaged $110,000 and other income including interest, royalties, sales of publications, etc. has averaged $50,000 per annum.

Industry levy revenue has declined as the volume of certified seed sold has fallen. Despite this decline in levy revenue, the value of the Program increased between 2008 and 2013 as partnerships were developed with other Research and Development Corporations (RDCs). Partnership development is a key feature of the 2013 to 2018 Plan.

Program commitments to cross-sectoral research issues are expected to represent a minimum of 5% of Program RD&E investment over the life of the Plan. The cross-sectoral issues that the Program will address include water use efficiency, environmental sustainability and the development of skills and leadership capacity.
Pasture Seeds Industry RD&E Objectives, 2013-2018

Five Year R&D Plan 2008-2013: Review summary

Investments in the Pasture Seeds RD&E Program 2005 to 2012 were reviewed by Agtrans Research (2013) against the objectives of the 2008-2013 Five Year Plan. The objectives of the 2008-2013 Five Year Plan were:

1. Develop new pasture seed products, markets and farm systems
2. Environmentally sustainable seed production systems
3. Improved seed production and processing technologies
4. Industry communication and capacity building
5. Monitoring, evaluating and adopting emerging sciences and technologies.

Agtrans Research (2013) found that RIRDC investments in projects addressing these objectives generated pasture seed grower and community benefits that included: increased yield / yield loss avoided; reduction in input costs; increased profitability from industry expansion (in export markets); improved demand; decrease in adverse environmental impacts from production; and increased scientific and industry capacity.

In 2014 current Pasture Seed Program projects are strongly oriented toward Objective 1 (new pasture seed products) and Objective 3 (improved pasture seed production) and include:

- Commercial seed technology for *Bituminaria bituminosa* var. *albomarginata* (close to commercialisation in 2014)
- Development of molecular markers for cultivar identification (completion and delivery scheduled for 2015)
- Introgression of tolerance to the nematode *Pratylenchus neglectus* into annual medics (completion and delivery scheduled for 2015)
- Evaluating different fertilisers in lucerne seed production (project being delivered by Lucerne Australia and generating considerable grower interest)
- Drop tube irrigated lucerne seed, herbage yield and plant persistence evaluation (project being delivered by Lucerne Australia and measuring both seed and herbage yield)
- Evaluating drop tube and sprinkler irrigation for white clover seed production (Alpha Group Consulting project scheduled for completion in 2014).

The ongoing relevance of 2008-2013 Five Year Plan objectives was tested through consultation, SWOT and trend analysis. Previous Five Year Plan objectives were found to be relevant to the development of the 2013-2018 Five Year Plan.
Key Outcomes for producers from the 2008-2013 5 Year Plan R&D

Lucerne seed wasp

A plague of lucerne seed wasp was experienced by Keith-based lucerne seed growers in 2012. The effect was a huge reduction in lucerne seed yield, with up to 80 per cent losses incurred. Two pieces of R&D managed by RIRDC (“Evaluating and Managing Lucerne Seeds Wasp in Lucerne Seed Crops” https://rirdc.infoservices.com.au/items/01-136 and “Living with the Enemy” https://rirdc.infoservices.com.au/items/01-135) were delivered to the region for distribution through Lucerne Australia and communicated through articles in the Lucerne Australia newsletter and via the media to affected growers. These RIRDC works, although preventative in prescription, have been widely received and promoted much discussion about prevention of the wasp in future years. From this RIRDC research, a one-page management plan “summary” has also been formulated, thereby creating different ‘packaging’ of the information to suit growers and ensure wide adoption of preventative practices.

Lucerne seed contract

Keith Seeds Pty Ltd went into receivership between September-December 2010, affecting growers who supplied seed to this business. RIRDC had been working on a seed contract template for growers called “A fair dinkum seed contract” https://rirdc.infoservices.com.au/items/11-086 which drafted a Seed Production Agreement that is easy to understand and use. The agreement sets out obligations of the grower and the buyer, and the details of the contract. The lucerne seed industry has used this template, worked closely with growers and seed companies through a sub-committee of Lucerne Australia, to create a lucerne seed specific contract that will now be used across the industry.

Fertiliser trial

Lucerne Australia has a RIRDC-funded ‘In-field lucerne seed fertiliser trial’ based near Keith, in SA. Funding is being invested into the research trial and subsequent dissemination of outcomes through extension activities. The fertiliser program of the lucerne seed industry has been in severe need of a revisit as the only independent, publicly available, Australian data relating to fertiliser use in lucerne seed dates back to the 1960’s. Consequently, local growers are eagerly anticipating the results to enable them to more cost effectively fertilise crops which will potentially lower cost of production and increase margins. This three-year, independent trial commenced in April 2012 at a lucerne property near Keith, SA and 30 plots are marked out in both dryland and irrigated paddocks. Growers have attended the annual trial site field day (February annually) seeing for themselves the benefits of a range of different fertilisers. Outcomes to date have shown – in clear terms – the relative gross margins.

Symposium support

A number of symposiums have been supported that have had excellent attendance by lucerne seed growers on a range of topics. These include:

- 2008: Irrigation Expo and Symposium
- 2009: Pollination Symposium
- 2010: Integrated Pest Management Symposium
- 2011: Seed Quality Symposium
- 2013: ‘GM friend or foe?’ Symposium
Pasture seeds industry RD&E objectives, 2013-2018

Stakeholder consultation was used to establish 2013-2018 Five Year Plan priorities. Consultation included interview of thirty informed industry stakeholders (see Appendix 4). Stakeholders included all RIRDC Pasture Seeds Advisory Committee members and a special emphasis on commercial supply chain partners. Commercial supply chain partners interviewed included seed producers, temperate legume plant breeders, seed production and marketing companies (domestic and international), seed wholesalers (domestic and international), seed processors and seed inspection and testing agencies. Industry representative organisations and industry peak bodies were also interviewed. Plan specific personal interviews were supplemented by review of a recently completed Lucerne Australia grower priority setting survey. Lucerne is the single largest pasture seed crop.

A comprehensive SWOT analysis based on consultation results and literature review was completed and is included as Appendix 5. Key trends and their implications drawn from the SWOT analysis include:

- Decline in the number of pasture seed growers and representative organisations – initiatives are required to improve the efficiency, profitability, risk management, market knowledge and capacity of remaining growers and to encourage new growers. The industry must engage with pasture based and other relevant industries to ensure strategic alignment, augmentation of research resources and ongoing relevance.

- The ongoing redirection of public sector investment and infrastructure away from plant breeding. Disinvestment in public sector plant breeding necessitates this Program’s investment where there is market failure – typically this includes pre-breeding, breeding of new species (e.g. biserrula, sulla and birds foot trefoil) and in the provision of independent information on the performance of new varieties through variety trials.

- Changing market structure including alignment of growers with commercial seed companies and the increasing complexity of the supply chain; the continued presence of public sector pathways to market operating alongside the private sector; and an increasing number of public-private partnerships to deliver proprietary cultivars. RIRDC partnerships with public and private partners are needed to ensure research is relevant to both ‘traditional’ domestic supply chains dominated by the public sector and emerging export opportunities that are highly commercial in nature.

- The emergence and then dominance of the export market for temperate pasture legumes. Export markets account for more than 70% of sales and further export sales may be possible as the A$ trends down over the life of this Plan (ABARES 2014). Market research including understanding and meeting the requirement of export markets is essential.

RIRDC is committed to achieving significant benefits to industry within its available resources, through the implementation of targeted and high-impact RD&E projects. The consultation process and research driver analysis completed as part of plan preparation highlighted a number of issues that the pasture seeds industry considers roadblocks to growth and development. Of these impediments, those that can be addressed with targeted RD&E have shaped RIRDC’s investment priorities for the next five years. Whilst not every problem raised can be addressed, these priorities aim to achieve high-impact, far-reaching benefits for the industry. The order of the objectives is in priority order as 1 most important, and priorities within the objectives reflects the highest priorities towards the top of each objective, as determined by the industry.

Objectives will be reviewed annually, as part of RIRDC’s Annual Industry Review process. Further consultation and feedback will be sought from stakeholders, to adjust or amend objectives as the industry grows.

Allocation of funding for these priorities will also be considered annually, as part of RIRDC’s Annual Operating Plan (AOP). The AOP is available on the RIRDC website, https://rirdc.infoservices.com.au/items/12-001.
Enabling Objective: Improved alignment between industry objectives and research and development outcomes

This objective aims to:

Ensure the ongoing relevance of RIRDC pasture seed RD&E investments by using Program funds to secure alliances, collaborations and partnerships with other RDCs, researchers and the commercial seed sector. If successful, investment in this objective will increase resources available for temperate pasture seed research and ensure alignment of strategies between the Program, leading researchers, co-funders with an interest in purchasing seed products and commercial partners who are able to provide a pathway to market for research products. This objective is to be applied to each of the following objectives.

Strategies

- RIRDC Pasture Seeds Program to actively foster and secure, alliances, collaborations and partnerships.

- Partner with domestic and international research providers to tap existing IP and research endeavours as well as add value to RIRDC Program investments – current CRCs (Australia), the Foundation for Arable Research (New Zealand) and the Nobel Foundation (United States).

- Identify strategic alliances and partnerships with private sector to form mutually beneficial co-investments in seed production related RD&E – seed companies, seed processors, etc. Seed companies and processors to be identified through industry profiling.

- Partnerships to be explored with RDCs that have an interest in pasture seed products – these include MLA, AWI, Dairy Australia, GRDC (in southern grain crop rotations) and the RIRDC Fodder Crops Program.

- Investigate the relevance of the Pasture Renewal Initiative which aims to bring together RDCs, seed companies and representative bodies in the pasture, fodder and pasture seed industries. If relevant provide, RD&E support to the Pasture Renewal Initiative.

- Engage with pasture seeds industry representative bodies to ensure the relevance and facilitate the adoption of RD&E investments. Industry bodies include Grain Producers of Australia – Seed Industry Committee; the Australian Seed Federation; Lucerne Australia; South East Seed Growers Group (of the Victorian Farmers Federation); Grasslands Society of Southern Australia; and Mackillop Irrigation Management Group (formerly White Clover Growers Association).
Objective 1: Focus on growth of domestic and export pasture seeds markets

This objective aims to:
Grow the domestic market by completing and communicating research that establishes the benefits of growing temperate legumes using certified pasture seeds. The objective also addresses the overwhelming importance of understanding and growing the export market for Australian pasture seeds. The export market currently absorbs more than 70% of certified pasture seed production and would appear to have potential for additional growth.

Strategies

Export market growth

- Invest in additional export market development projects consistent with initial research results. Projects may include product development (e.g. adoption of international quality benchmarks), supply chain and market access investments. Priority markets may include the US, South America, the EU (especially the eastern EU), the Middle East, China, South East Asia and South Africa.

- Assemble export market statistics, profile countries that grow temperate pastures, identify priority export markets, research market requirements and identify research projects that will facilitate export market growth. Give consideration to the development of an export market strategy for Australian pasture seeds.

Domestic market growth

- Complete research with appropriate partners that demonstrates to relevant Australian industries the economic, social and environmental benefits of growing temperate legumes. Relevant industries and partner RDCs might include red meat (MLA), wool (AWI), Dairy Australia, GRDC (in southern grain crop rotations) and the RIRDC Fodder Crops Program.

- Complete research with appropriate partners that demonstrates the reduction in risk associated with purchasing and sowing high quality certified pasture seeds and the risk associated with lower cost, lower quality planting material. Research outputs will be relevant to livestock producers, grain growers and fodder producers.

Key performance indicators

- Two significant export development projects have been funded by the Program by 2018.
- Market research to scope export development opportunities has been completed by 2017.
- Data on the benefit to key Australian industries of growing temperate legumes has been prepared and communicated to potential RDC partners by 2016.
- Data on the benefit of certified seeds has been prepared and communicated to relevant landholders in temperate Australia through appropriate extension channels by 2016.

Impact and consequences

- Investments made under this objective will contribute to growth in both domestic and export market pasture seed sales. It is reasonable to expect the domestic market to grow from approximately $30 million in 2013 to $35 million in 2018 while the export market might grow from $80 million to $90 million over the same time period.

Indicative share of RD&E budget

- 15% of Program budget is allocated to Objective 1.
Objective 2: Improved industry capacity through skills and leadership training

This objective aims to:

Identify and put in place the research, production, processing, marketing and extension skills needed by industry to secure a profitable and sustainable future. A small number of pasture seeds industry participants will also be provided with the opportunity to develop as leaders and progress their professional development for the benefit of their business, the industry and their local community.

Strategies

- Support relevant leadership training including funding the participation by individuals from the pasture seeds industry in leadership courses including the Australian Rural Leadership Program, Nuffield, Horizon and the RIRDC Rural Women’s Award.
- Complete an industry skills audit to determine skills needed in research and along the supply chain. Match audit findings to the profile of industry capacity prepared in Objective 2. Use gap analysis to establish priorities for skills and leadership development.
- Investigate the need for, and deliver, additional seed industry training courses and resources in partnership with the Australian Seed Association (ASA) Seed Industry Training Advisory Group (SITAG).
- Add to existing seeds industry research capacity. Investments may include partial funding of a research position for an individual working in pasture seeds agronomy, crop protection, plant physiology or other relevant discipline.
- Foster linkages between Australian and international temperate seed researchers. The focus of this strategy should be on early to mid-career professionals in order to provide long-term industry benefits.

Key performance indicators

- Two potential industry leaders have benefited from Nuffield, ARLP, Horizon, Rural Women or similar by 2018.
- Gaps in research capacity identified and consideration given by the Pasture Seeds Program to provision of funding to fill the most critical – KPI delivered by 2017.
- Two additional competency modules added to SITAG training courses by 2018.
- A 10% increase in temperate seed industry participation in SITAG training courses by 201. A pasture seeds researcher partially funded in a project by 2017.
- International researchers are contributing to the Pasture Seeds Program by 2018.

Impact and consequences

- Industry has invested to ensure that it has the skills and leadership to secure its future.

Indicative share of RD&E budget

- 15% of Program budget is allocated to Objective 2.
Objective 3: Production and processing efficiency and improved sustainability

This objective aims to:

Increase the profitability of temperate pasture seed production and processing, decrease growing risk and improve environmental sustainability by providing new varieties, agronomic recommendations, harvesting technologies, biosecurity initiatives, sustainability measures and production and processing best practices.

Strategies

- **Biosecurity** – monitor and respond to new pest and disease threats especially those that have the potential to limit market access. Ensure entomology and pathology capacity is in place to respond to pest incursions (link to Objective 4). Contract Plant Health Australia or similar to document industry needs in an easily communicated biosecurity plan.

- **Pollination** – align with the RIRDC Honeybee and Pollination Program proposal for a Australian-European Union joint pollination research program so that research on Lucerne is supported to examine if the effects observed relate to Lucerne seed production in Australia.

- **Breeding** - continue to invest in plant breeding and germplasm evaluation where there is market failure. Breeding will target new temperate pasture species that offer improved yield and forage quality. Investments in breeding should consider seed yield, water and nutrient use efficiency, acid soil tolerance, controlled flowering, ease of harvest and forage quality. It is noted that progress in multiple desirable attributes is more difficult than a focus on a single seed industry priority.

- **Variety trials** – The Pasture Seeds Program will join the Pasture Variety Trial Network (PVTN) and work with MLA to ensure independent evaluation of new temperate pasture types along with feedback to seed growers and breeders.

- **Guidelines** - prepare global best practice guidelines and benchmarks that address establishment, management, harvesting and processing incorporating outputs from breeding, agronomic, biosecurity and sustainability investments.

- **Agronomy** – nutrition management packages that address nitrogen, phosphorus, zinc, iron and sulphur and their role in determining seed yield and quality. Investigate the potential role in plant nutrition of new technologies including favourable micro-organisms.

- **Agronomy** – farming systems research including rotations and species combinations that support large-scale pasture seed production.

- **Agronomy** – new weed management tools including herbicide regimes and delivery technologies to counter herbicide resistance, manage delayed permanent water sowing and anticipate spray drift regulations.

- **Agronomy** – research, understand and communicate pasture seed variety tolerance to current and anticipated chemicals i.e. herbicides, insecticides and fungicides.

- **Harvesting** – support harvesting machinery research with an emphasis on increasing the ease, safety, efficiency and cost-effectiveness (e.g. energy use) of equipment. Focus on technology to remove same size weed seed, forage matter and soil. Support technologies that reduce the environmental impact of harvest.

- **Sustainability** – address priority issues including understanding and managing the use of ground and surface water and environmentally benign ways of managing paddocks during and after harvest. Give consideration to development of an EMS program for the pasture seeds industry.
Key performance indicators

- A biosecurity plan incorporating industry requirements for entomology and pathology is prepared and communicated to growers, their advisors and policy makers by 2017.
- Investment into pollination research that increases Lucerne seed set has been completed and information delivered to growers by 2018.
- Broadening of the Pasture Variety Trial to be incorporated within the MLA trial has been achieved by 2018.
- Investments in plant breeding deliver one new pasture seed variety valued by growers by 2018.
- Three global best practice guidelines, incorporating outputs from breeding, agronomic, biosecurity and sustainability investments, are prepared and distributed to growers by 2018.
- Agronomy project outputs inform global best practice guidelines by 2018.
- One significant investment is made in harvest machinery efficiency by 2018.
- RIRDC has invested in scoping a pasture seeds industry EMS by 2016.

Impact and consequences

- As a consequence of investments made to deliver Objective 3, pasture seed production will be viewed by growers as more profitable with fewer production and processing risks.

Indicative share of RD&E budget

- 50% of Program budget is allocated to Objective 3.
Objective 4: Improved industry knowledge with data, extension and communication

This objective aims to:

Improve industry knowledge through the provision of accurate pasture seeds data, the identification of key industry influence agents and delivery of an effective extension and communication strategy.

Strategies

- Prepare a comprehensive profile of the Australian pasture seeds industry and establish protocols for its routine update. Profile to include ABARES/LRS area, volume and value estimates; stakeholder profiles; market shares held by international competitors; industry capacity (including infrastructure); the private and public sector R&D project pipeline; and the outlook on disruptive technologies.
- Develop and roll out a communication and extension strategy based on the map of industry influence agents.
- Identify and map industry influence agents i.e. those sources of information used by growers and their advisors to obtain management and innovation information. Generic sources will include newsletters, field days, demonstration sites and fact sheets.
- Work with ABARES and or the Levies Revenue Service (LRS) to design a system that can be used to accurately and cost effectively determine industry production area, volumes, values and GVP.

Key performance indicators

- A profiles, international market shares, competencies, capabilities and pipeline report is available to industry by 2016.
- Cost effective and partner aligned extension and communication is achieved by 2017.
- A communication strategy is produced with the industry by 2018.
- Reliable production and GVP statistics available to the industry by 2015.

Impact and consequences

- Program R&D outputs are effectively communicated to the temperate pasture seeds industry and industry and RIRDC are able to use GVP, stakeholder, market and pipeline data to invest in an informed way.

Indicative share of RD&E budget

- 20% of Program budget is allocated to Objective 4.
## Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABARES</td>
<td>Australian Bureau of Agricultural and Resource Economics and Sciences</td>
</tr>
<tr>
<td>AOP</td>
<td>Annual Operating Plan</td>
</tr>
<tr>
<td>ASA</td>
<td>Australian Seed Association</td>
</tr>
<tr>
<td>ASF</td>
<td>Australian Seed Federation</td>
</tr>
<tr>
<td>AWI</td>
<td>Australian Wool Innovation</td>
</tr>
<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>GPA</td>
<td>Grain Producers Australia</td>
</tr>
<tr>
<td>GRDC</td>
<td>Grains Research and Development Corporation</td>
</tr>
<tr>
<td>GVP</td>
<td>Gross Value of Production</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>LRS</td>
<td>Levies Revenue Service</td>
</tr>
<tr>
<td>MLA</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>PVTN</td>
<td>Pasture Variety Trial Network</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RDC</td>
<td>Research and Development Corporation</td>
</tr>
<tr>
<td>RD&amp;E</td>
<td>Research, Development and Extension</td>
</tr>
<tr>
<td>RIRDC</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>SITAG</td>
<td>Seed Industry Training Advisory Group</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
</tbody>
</table>
References


ABARES (March 2014) Outlook Conference


IP Australia (2012) 'Plant Breeders Rights database.' (IP Australia, Australian Government:


RIRDC (various) Pasture Seeds Projects and Research in Progress


# Appendix 1 Alignment of Program objectives with Government and RIRDC priorities

<table>
<thead>
<tr>
<th>Strategic Research Priorities</th>
<th>Rural Research Priorities</th>
<th>RIRDC Strategies</th>
<th>Program Objectives and Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting productivity and economic growth</td>
<td>Productivity and adding value</td>
<td>Manage demand driven RD&amp;E that meets industry needs</td>
<td>Objective 3: Production and processing efficiency and improve sustainability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Facilitate investments that deliver economic, social and environmental benefits for rural industries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase knowledge about rural industry development options that offer regional economic development opportunities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adopt a lifecycle approach to investment in new, developing and established industries</td>
<td></td>
</tr>
<tr>
<td>Supply chain and markets</td>
<td>Deliver analysis on issues of national importance to the rural sector and broader community</td>
<td></td>
<td>Enabling Objective: Improved alignment between industry objectives and research and development outcomes</td>
</tr>
<tr>
<td></td>
<td>Assess the feasibility, value and potential competitiveness of new plant and animal industry opportunities</td>
<td></td>
<td>Objective 1: Focus on the growth of domestic and export pasture seeds markets</td>
</tr>
<tr>
<td>Promoting population health and wellbeing</td>
<td>Biosecurity</td>
<td>Work collaboratively on cross sector issues that impact across industries</td>
<td>Objective 3: Production and processing efficiency and improve sustainability</td>
</tr>
<tr>
<td>Living in a changing environment</td>
<td>Climate variability and climate change</td>
<td>Work collaboratively on cross sector issues that impact across industries</td>
<td>Objective 3: Production and processing efficiency and improve sustainability</td>
</tr>
<tr>
<td>Managing our food and water assets</td>
<td>Natural resource management</td>
<td>Encourage the sustainable use and management of natural resources</td>
<td></td>
</tr>
<tr>
<td>Securing Australia’s place in a changing world</td>
<td>Innovation skills</td>
<td>Promote leadership, capacity, skills and pathways that create opportunities.</td>
<td>Objective 2: Improved industry capacity through skills and leadership training.</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td>Encourage research that fosters science and creativity</td>
<td>Objective 4: Improve industry knowledge with data, extension and communication.</td>
</tr>
</tbody>
</table>

Appendix 2: Industry Analysis

The role of temperate legume pasture species in livestock production

Australia’s temperate pasture legumes have been developed to fit diverse climates, soil types, farming and livestock production systems across the temperate regions of south-eastern Australia and south-west Western Australia.

The 2010 Meat and Livestock Australia (MLA) audit of the pasture feedbase within south-eastern Australia and south-west WA aimed to identify and quantify the area of improved pasture containing one or more of the temperate legume pasture species of particular interest to the RIRDC Pasture Seeds Program (Figure 1 and Table 1).

Figure 1: Estimated grazing area (ha) of temperate pasture legumes species of interest

Of the estimated area planted to temperate pasture legumes, it was estimated that New South Wales has the largest area planted with a total of 3.62 M ha followed by WA (1.97M ha), South Australia (1.93M ha), Victoria (965.60k ha) and Tasmania with the smallest area (118.77k ha).
### Table 1: Estimated grazing area (ha) of RIRDC pasture legumes of interest by State (2011)

<table>
<thead>
<tr>
<th>Pasture grazing area composed of RIRDC legume species of interest (ha)</th>
<th>State</th>
<th>NSW</th>
<th>Victoria</th>
<th>SA</th>
<th>WA</th>
<th>Tasmania</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucerne</td>
<td></td>
<td>1,756,800</td>
<td>208,221</td>
<td>266,908</td>
<td>33,369</td>
<td>11,598</td>
<td>2,276,896</td>
</tr>
<tr>
<td>Sub-clover</td>
<td></td>
<td>1,127,082</td>
<td>495,415</td>
<td>408,203</td>
<td>1,455,555</td>
<td>69,332</td>
<td>3,555,587</td>
</tr>
<tr>
<td>Clover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White clover</td>
<td></td>
<td>296,968</td>
<td>261,957</td>
<td>6,308</td>
<td>37,839</td>
<td>603,072</td>
<td></td>
</tr>
<tr>
<td>Balansa clover</td>
<td></td>
<td>27,883</td>
<td>44,992</td>
<td></td>
<td></td>
<td>72,875</td>
<td></td>
</tr>
<tr>
<td>Red clover</td>
<td></td>
<td>20,379</td>
<td></td>
<td></td>
<td></td>
<td>20,379</td>
<td></td>
</tr>
<tr>
<td>Persian clover</td>
<td></td>
<td>107,586</td>
<td></td>
<td></td>
<td></td>
<td>107,586</td>
<td></td>
</tr>
<tr>
<td>Ball clover</td>
<td></td>
<td>12,096</td>
<td></td>
<td></td>
<td></td>
<td>12,096</td>
<td></td>
</tr>
<tr>
<td>Strawberry clover</td>
<td></td>
<td></td>
<td></td>
<td>40,622</td>
<td></td>
<td>40,622</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>242,291</td>
<td></td>
<td></td>
<td></td>
<td>242,291</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>707,203</td>
<td>261,957</td>
<td>40,622</td>
<td>51,300</td>
<td>37,839</td>
<td>1,098,921</td>
</tr>
<tr>
<td>Medics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>377,085</td>
<td>377,085</td>
</tr>
<tr>
<td>Barrel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>269,502</td>
<td>94,349</td>
<td>363,851</td>
</tr>
<tr>
<td>Burr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>503,757</td>
<td>75,448</td>
<td>579,205</td>
</tr>
<tr>
<td>Woolly-burr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51,488</td>
<td></td>
<td>51,488</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>11,668</td>
<td>126,253</td>
<td></td>
<td>137,921</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,213,500</td>
<td>296,050</td>
<td></td>
<td>1,509,550</td>
</tr>
<tr>
<td>Serradella</td>
<td></td>
<td>32,225</td>
<td></td>
<td>117,274</td>
<td></td>
<td>149,499</td>
<td></td>
</tr>
<tr>
<td>Biserrula</td>
<td></td>
<td></td>
<td></td>
<td>15,989</td>
<td></td>
<td>15,989</td>
<td></td>
</tr>
<tr>
<td>RIRDC legume species of interest</td>
<td></td>
<td>3,623,310</td>
<td>965,593</td>
<td>1,929,233</td>
<td>1,969,537</td>
<td>118,769</td>
<td>8,606,442</td>
</tr>
</tbody>
</table>

**Notes to the table:**

- Total area of pasture species (ha) = % composition of pasture type x area of grazing area (ha) x % pasture species content.
- Not all RIRDC pasture legumes of interest are grown within each agro-ecological region, State or within an individual pasture paddock.
- Grazing pastures may be composed of one or more RIRDC pasture legumes of interest.
- The data generated is based on the informed opinions and/or best guestimates of professional agriculturalists therefore it should not be mistaken for objective measurement.

Of the temperate legumes of interest, sub-clover is the most widely sown annual pasture legume having been sown across an estimated 3.56 M ha\(^1\). Being distributed in more than 50% of the total area sown down to temperate legume species (i.e. WA – 73.9%, Victoria – 51.3%, Tasmania – 58.4%), except in SA (21.2%). It consists of three subspecies:

(i) ssp. *subterraneum*, adapted to well-drained, acidic soils;

(ii) ssp. *yanninicum*, adapted to poorly drained, acidic soils; and

---

Of the 45 cultivars registered in Australia there are 15 naturalised strains, 11 introductions collected from the wild, 18 crosses, and one induced mutant.

Lucerne is the second most common pasture legume grown across all States. Since 1990, when 21 cultivars were registered on the Register of Australian Herbage Plant Cultivars, a further 49 lucerne cultivars have been listed with either the Register or on the Australian Plant Breeder’s Rights (PBR) database.

There has been a proliferation of cultivars released by private breeding companies. Some of these have been imported from overseas breeding programs for use in Australia, while many have been developed with a focus on producing seed for export markets. To date, cultivars from these companies have had little impact on the Australian domestic market.

As illustrated in Table 4, annual medics have been sown across an estimated area of 1,509,550 ha of grazing land. In SA (62.9%) and to a lesser extent in WA (15.0%), medics form a significant component of legume-based pastures.

Nine annual medic species, with 40 registered cultivars, have been commercialised. These consist of the most widely-sown species, barrel medic, strand medic, and burr medic, and the less important species, disc medic (M. turnata (L.) Mill.), snail medic (M. scutellata (L.) Mill.), sphere medic (M. sphaerocarpa Bertol.), gama medic (M. rugosa Desr.), murex medic (M. murex Willdl.) and button medic (M. orbicularis (L.) Bartal.).

White clover is the most important perennial pasture legume in the high-rainfall, cool temperate zones of south-eastern Australia and south-west WA. It is widely sown in coastal areas of Victoria, NSW, Tasmania and in the irrigation area of WA where it primarily supports dairying together with beef and fat lamb production. To date, 30 cultivars have been listed, 23 of these cultivars have been released since 1989 following the introduction of Plant Breeder’s (formerly Plant Variety) Rights. AgResearch (NZ) has bred 10 of these 23 cultivars, while nine have been released by private seed companies which were based on cultivars imported from other countries or from re-selections within older cultivars. Several other re-badged cultivars are also listed with the ASA for export seed markets.

Since 1992, 14 annual pasture legumes new to Australian agriculture have been released, including seven species new to world agriculture. In addition, Australian plant breeders have adapted the temperate feedbase with cultivars of six species previously commercialised in other countries. Examples of these include:

- Biserrula - cvv. Casbah and Mauro,
- Gland clover (Trifolium glanduliferum Boiss) - cv. Prima,
- Eastern star clover (T. dasyurum C. Presl) - cv. Agwest® Sothis,
- Bladder clover (T. spumosum L.) - cv. Agwest® Bartolo,
- French serradella - cvv. Cadiz, Margarita, Erica, and Eliza
- Crimson clover - cvv. Caprera
- Arrowleaf clover - cvv. Arrotas
- Berseem clover - cvv. Elite II and Memphis

Temperate legume variety development

Until the mid-1980s the primary source of temperate pasture legume cultivars derived from the major temperate pasture legume species was the public sector, primarily from various State-based Departments of

---

Agriculture and CSIRO breeding programs. The pathway to market for publicly produced plant varieties at this time was based on delivering plant varieties to growers at as low cost as possible and, where possible, allowing them to reproduce seed for repeated use (i.e. grower-saved seed). Hence, the model for delivery was based on the use of intermediary seed growers being licensed to on sell planting seed to other growers.

This breeding, production and marketing process changed during the mid-1980s to the start of 2000 due to:

(i) The advent of Plant Breeders’ Rights (PBR) in 1987 (initially Plant Variety Rights), which allowed the protection of new cultivars as intellectual property. This coincided with the entry of a number of private plant breeding companies into the Australian pasture market; and

(ii) The decision by State and federal governments to reduce public sector funding into agricultural research, in particular plant breeding. This was on the basis of governments withdrawing funding from activities that could be in direct competition to private sector providers. The only exception being where there was either ‘market failure’ (i.e. a lack of private sector investment) or where the established breeding program could contribute to focusing on delivery of pre-breeding outcomes that could be shared across the private sector.

As a result of these events, the established public sector pasture breeding programs have had to:

(i) withdraw from plant breeding;

(ii) form alliances with other public sector-aligned programs to focus on ‘market failure and/or pre-breeding (e.g. Future Farm Industries CRC, CLIMA); and/or

(iii) form strategic alliances either directly or via a CRC with private companies.

Of the three options, the majority of public sector pasture plant breeders have opted for participating in the latter two options (Table 2).

Table 2: Public and private sector temperate pasture legume partnerships

<table>
<thead>
<tr>
<th>Species</th>
<th>Public sector partner</th>
<th>Private sector partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucerne</td>
<td>• SARDI</td>
<td>• Heritage Seeds</td>
</tr>
<tr>
<td></td>
<td>• NSW DPI</td>
<td>• Seed Distributors</td>
</tr>
<tr>
<td></td>
<td>• University of Queensland</td>
<td>• PGG Wrightson</td>
</tr>
<tr>
<td>White clover</td>
<td>• NSW DPI/Agrisearch (NZ)</td>
<td>• PGG Wrightson</td>
</tr>
<tr>
<td></td>
<td>• Dairy Futures CRC</td>
<td>• Heritage Seeds</td>
</tr>
<tr>
<td>Sub-clover</td>
<td>• DAFWA</td>
<td>• SeedForce</td>
</tr>
<tr>
<td>Other pasture</td>
<td>• SARDI</td>
<td>• Heritage Seeds</td>
</tr>
<tr>
<td>legumes</td>
<td>• Tasmanian Institute of Agriculture</td>
<td>• TasGlobal</td>
</tr>
</tbody>
</table>

This has had a positive two-way effect — it has provided additional funding for pasture breeding in the face of declining public investment and has resulted in closer alignment between the visions of pasture breeders and the commercial realities of the seed market.8

The greatest interest has been shown by seed companies in the more traditional, widely-sown pasture legume species (such as lucerne and white clover), as there is less risk attached compared with new species (for example, biserrula, sulla and birdsfoot trefoil) and less investment required to facilitate on-farm adoption.

An additional benefit to the development of temperate pasture legumes for south-eastern Australian and south-west WA is that a number of the current pasture seed companies have linkages to international pasture breeding companies, which allows elite, overseas-bred material to be tested under Australian field conditions.

---

conditions for release onto the Australian market. This is particularly the case with the major international pasture legumes lucerne, white clover and red clover.

More recently, RDCs such as MLA, RIRDC, Dairy Australia and AWI have invested into pasture plant breeding via initiatives such as Pastures Australia, the MLA Feedbase Investment Plan and targeted programs within CSIRO and various CRCs.

The pathway to market for temperate pasture legume varieties.

As a result of these developments, the pathway by which temperate pasture legume varieties and planting seed enter the domestic (Figure 2) and export (Figure 3) markets has become more complex during the past 20 years than was previously experienced. The complexity has evolved as a result of:

i) an increased number of private sector pasture seed supply participants;

ii) the establishment of public/private sector relationships;

iii) the continued presence of the established public sector pathways to market, operating in parallel to private sector participants; and

iv) the emergence and dominance of the export pasture seed market versus the contracting domestic planting seed market.
Figure 2: The pathway to market for domestic temperate pasture legume seed

**Current Pasture Seed Supply Mechanism**

Seed sale flow (% of business to participants) & Variety License Holdings (% held by groups)

Germplasm

Breeders

Seed Growers

Seed Marketers (wholesalers)

Regional Seed Wholesalers

SeedRetailers

Growers / Farmers

Private Breeding Sourced Variety Licenses

Public Breeding Sourced Variety Licenses

Figure 3: The pathway to market for export temperate pasture legume seed

Australian Temperate Legume Pasture Seed Growers

- Variety License Holders
- Wholesale Seed Companies
- Export Marketers

Excess Proprietary Production Sold as VNS Seed

Seed Brokers

International Seed Companies/Wholesalers

Proprietary Varieties
- Contract Production
- Public Varieties
- VNS: Variety Not Specified
Temperate pasture legume seed industry location

Underpinning the pathway to market for temperate legume pasture seed for each of the RIRDC’s species of interest is the role of the seed grower, who is primarily responsible for multiplying the seed supplied by plant breeders and/or licensed seed companies and making it available for sale to either domestic and/or export markets.

The most favourable environments for temperate pasture legume seed production is limited to the more reliable agro-ecological regional locations within each State (Figure 4).

**Figure 4: Major temperate pasture legume seed production areas**

Within south-eastern Australia and south-west WA seed industry stakeholders have estimated there are about 400 to 650 growers producing temperate legume pasture seed for the market. However, industry stakeholders believe this number is declining. This is reflected in the number of seed growers submitting pasture seed for certification by the respective certification agencies. In 1999–2000 seeds certification agencies estimated a total of 639 growers were producing certified temperate pasture legume seed. By 2012–13 the number of seed growers submitting planting seed for certification had decreased to 489 across all temperate pasture legume species (Table 3).
Table 3: seed growers submitting temperate pasture legume seed for ASA certification.⁹

<table>
<thead>
<tr>
<th>Species</th>
<th>1999</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucerne</td>
<td>366</td>
<td>306</td>
<td>314</td>
<td>302</td>
<td>310</td>
<td>267</td>
</tr>
<tr>
<td>Sub-clover</td>
<td>114</td>
<td>87</td>
<td>63</td>
<td>62</td>
<td>61</td>
<td>69</td>
</tr>
<tr>
<td>Annual clovers</td>
<td>102</td>
<td>68</td>
<td>50</td>
<td>68</td>
<td>44</td>
<td>64</td>
</tr>
<tr>
<td>Perennial clovers</td>
<td>71</td>
<td>51</td>
<td>56</td>
<td>45</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Medics</td>
<td>57</td>
<td>18</td>
<td>16</td>
<td>14</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Serradella</td>
<td>0</td>
<td>13</td>
<td>16</td>
<td>12</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Biserrulla</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>639</td>
<td>567</td>
<td>515</td>
<td>516</td>
<td>482</td>
<td>489</td>
</tr>
</tbody>
</table>

Industry stakeholders broadly classify temperate pasture legume seed growers into two categories:

1. **Long-term ‘professional’ seed growers:** These growers generally designate a part of their farming operation to temperate legume pasture seed production. Pasture seed is grown as a ‘crop’ and paddocks are managed to generate maximum seed yield per hectare. Generally, these growers have many years of experience in producing pasture seed for the certified and non-certified seed market— in particular the export seed market. Often these seed growers will employ agronomists and consultants for production and pest control advice. Depending on the location and species of temperate legume being demanded and produced these seed growers mostly aligned and contracted with a commercial seed company.

2. **Short-term ‘opportunistic’ seed growers:** These are growers who take advantage of favourable seasonal conditions (i.e. early break in the season) and based on initial germinations of previously-sown temperate pasture legume species (generally sub-clover and medics) take the opportunity to ‘clean up’ the paddock for harvest and marketing of the seed (generally uncertified) either to the seed trade or through direct farmer-to-farmer sales.

Currently there is no one national industry organisation that collectively represents temperate pasture legume seed growers or planting seed processors. Temperate pasture legume seed growers may be affiliated with one or more organisations such as:

- Lucerne Australia: [www.lucerneaustralia.org.au](http://www.lucerneaustralia.org.au)
- Australian Seed Federation: [www.asf.asn.au](http://www.asf.asn.au)
- Grasslands Society of Southern Australia: [www.grasslands.org.au](http://www.grasslands.org.au)

---

⁹ Source: AgWest (DAFWA - WA), Seed Services (PIRSA - SA), AgriQuality (Victoria/ NSW).
The size and value of the Australian temperate legume pasture seed market

Due to the lack of a formalised data collection and collation processes, an accurate estimation of the size, area and volume of temperate legume pasture seed produced within south-eastern Australian and south-west WA is difficult to generate. The only formal statistics recorded within the pasture seed industry are collated by the ASA and relate to the area and volume of certified seed produced each year as this seed generates RIRDC R & D levies.

For the period 2007–08 to 2010–11 the volume of pasture seed that was certified that generated RIRDC levies had declined significantly from approximately 12,800 tonne (t) to 5,200 t (see Figure 5). However, these figures are not indicative of the pasture seed market as there is a significant volume of pasture seed that is either: i) uncertified and sold outside of the ASA certification scheme, or ii) is certified by ‘in-house’ certification schemes within seed companies. Currently the volume of pasture seed produced and processed through either option remains uncorrelated and open to speculation as to its share of the total planting seed market.

Lucerne Australia

Lucerne Australia has the largest group of seed growers as members, reflecting the role and value that lucerne production contributes to the Australian temperate legume pasture seeds industry.

In Australia, 83 per cent of total lucerne seed production is produced around the area of Keith, Naracoorte, Tintinara and Bordertown in SA, encompassing more than 16,000 hectares of both irrigated and dryland area.

The overall lucerne seed industry in Australia is currently worth about $95 million per year (2008 figures) with exports contributing about $30 million and domestic sales of $8.7 million.

The remainder of the value lies in associated inputs and the allied industries (for example, seedsprocessors and marketers) that are crucial to the lucerne seed value and supply chain.

The Australian lucerne seed industry is made up of more than 200 individual seed-producing businesses. It encompasses non-irrigated production (dryland) and irrigated production systems; mainly from center pivot and border-check (flood) irrigation systems. The Australian lucerne seed industry is capable of producing low dormancy through to highly winter-active varieties, which has led to companies world-wide approaching Australian lucerne seed growers to multiply seed.

An economic contributor to pasture seeds production is the overall value of the hay cut from the lucerne plant before seed is produced. During 2008, the value of production for lucerne hay in Australia was estimated to be about $210 million per year.\(^1\)

---
\(^{10}\) The data generated was based on the informed opinions and/or best guestimates of professional seed industry stakeholders therefore it should not be mistaken for objective measurements.
In addition to the temperate legume pasture seed certified under the ASA scheme, the three major certification agencies also sample and test pasture seed (for example, purity, off types, abnormals etc), which is not registered with the ASA. For 2007–08 to 2010–2011 the average certified versus uncertified seed tested by these agencies varied significantly between species (Figure 6).

Figure 6: Average (%) of certified and uncertified seed tested by seed certification agencies.
In recognition of the lack of information relating to the pasture seed market, a survey was undertaken during 2013 for the purpose of obtaining an industry based ‘best guestimate’ of the size, composition and value of the current temperate legume planting seed market.\textsuperscript{11}

Industry estimates indicate the major temperate legume species certified is lucerne (73%), primarily as a requirement for the export market. By contrast estimates for the serradella (23%) and annual clover (25%) market suggest that most pasture seed produced remains uncertified before entering the domestic or export markets (Figure 7).

**Figure 7: Average (%) of certified and uncertified seed estimated by industry stakeholders**

![Bar chart showing average (%) of certified and uncertified seed estimated by industry stakeholders.]

When compared with the certified vs uncertified values provided by the seed certification agencies the estimates provided by the seed industry stakeholders suggests there is a significant volume of temperate legume planting seed processed and marketed outside of the established sampling and testing schemes provided by the certification agencies.

Seed industry stakeholders estimate that for the 2007–08 to 2010–11 period the average annual volume of temperate legume pasture seed produced in Australia is about 20,600 t, of which the domestic market is estimated at about 5,400 t and the export seed market is 15,200 t (Figure 8). Lucerne is the major contributor (9,165 t) to the temperate legume pasture seed market followed by sub-clover (4,442.8 t), annual (2,473 t) and perennial clovers (2,479 t) and medics (1,986 t) (Figure 9).

\textsuperscript{11} The RIRDC Temperate Legume Pasture Seed Industry Survey (2013) was restricted to obtaining information relating to domestic and export wholesale trading of planting seed and does not include any allowance or estimates for “farmer to farmer” seed trading.
Figure 8: Estimated temperate legume planting seed market: domestic versus export

Figure 9: Temperate legume planting seed market volume x species (2007–08 to 2010–11)
Stakeholders estimate the average value of the Australian temperate legume pasture seed industry at about $107.2M, of which lucerne is the major contributor followed by sub-clover, perennial clovers, medics and annual clovers (Figure 10).

**Figure 10: Temperate legume planting seed market share value x species (2007-8 to 2010–11)**

Most of the value generated from the marketing of Australian-grown temperate legume pasture seed is from the export market ($77.6M) and the balance ($29.5M) is generated from the domestic market. The major species contributing the value generated from the export are lucerne ($46.1M) followed by sub-clover ($12.9M) and perennial clovers ($8.5M) (Figure 11).

**Figure 11: Australian temperate legume planting seed market value ($ M)**
Temperate legume pasture seed export market overview and outlook

Currently a number of United States of America (USA) based lucerne (alfalfa) seed production and distribution companies have either formed alliances with Australian seed companies or have independently established seed production supply chains with a number of Australian seed companies and/or seed growers. In addition, an increasing number of Australian-based companies have increased their focus on supplying pasture seed to the export market – primarily lucerne and to a lesser degree legume species such as annual clover as well as perennial clovers (primarily white clover).

The key markets into which Australia exported temperate pasture legume seed during 2010–11 and 2011–12 were Argentina, US, Saudi Arabia, China and Italy (Figures 12 and 13).

**Figure 12: Temperate legume planting seed exports x country x species (2009/10 - 2010/)**

![Figure 12: Temperate legume planting seed exports x country x species (2009/10 - 2010/)](image)

**Figure 13: Lucerne seed exports x country (2009/10 - 2010/11)**

![Figure 13: Lucerne seed exports x country (2009/10 - 2010/11)](image)
Recent sales of temperate legume pasture seed suggest that Australia has formed a solid base of export clients, especially in the equivalent climatic regions (Mediterranean) in the USA, South America, European Union and the Middle East. In addition, new markets for Australian-grown temperate legume pasture seed have been identified in regions such as Eastern EU, China and South-east Asia.

The key factors that will determine the level of demand and potential growth for Australian-grown temperate legume pasture seed include, but are not limited to:

- securing current export markets through the consolidation of relationships with current export customers and where feasible identifying and developing new market opportunities for Australian produced temperate legume pasture seed;
- the relative status of the exchange rate between Australia and that of its competitors in New Zealand and the USA, as this will determine the relative price competitiveness of Australian export seed in importing countries of interest;
- the ability of Australian temperate legume pasture seed growers to provide continuity in the supply of seed to markets (i.e. their ability to meet contract specifications);
- the ability of temperate legume pasture seed growers to maintain the quality of exported seed and to meet the increasing phytosanitary standards being put in place by importing countries;
- the ability of temperate legume pasture seed growers to access innovative technologies available to competitors for variety development and seed production; and
- the ability of temperate legume pasture seed growers to continue to focus on producing seed in an efficient and effective manner based on the continued adoption of ‘global best practice’ in the management, processing and marketing of ‘planting’ seed.

Temperate pasture legume planting seed domestic market overview and outlook

Within and between years the supply of temperate legume pasture seed for the domestic market can be sourced from a diverse range of seed production systems, which may either supply certified seed and/or uncertified seed. The main sources of temperate legume pasture seed are:

- domestic seed produced by seed companies – sold through seed merchants;
- domestic seed grown by seed growers – sold at the farm gate;
- seed imported from a range of countries including NZ, the US and South America;
- grower produced seed retained for ‘on-farm’ use – non-certified seed.

Production of planting seed for the domestic temperate pasture legume seed market has varied significantly with time due to two major long-term factors:

- the relatively low rates of pasture renewal across the dairy, beef and sheep industries. For example, it has been estimated the annual temperate legume pasture renewal rate for beef and sheep producers is 0.55% for sub-clover, 0.54% for white clover and 0.92% for Lucerne;
- the perceived lack of confidence in the pasture renewal process due the direct and indirect costs associated with establishment of a new pasture and the lack of persistence of pastures after they are established.

---

12 Certified seed is planting seed which has been produced and processed to meet one or more independently ratified quality international and or domestic assurance schemes. (e.g. OECD, AOSCA, Australian Seed Authority).
Other factors influencing the domestic temperate legume pasture seed market include:

- the value of livestock production;
- the replacement of pasture with grain production;
- the impact of climate events on seed production;
- the availability of seed for domestic supply versus export demand; and
- the cost of seed production domestically versus that of imported seed.

Despite these limiting factors there is a large number of public and proprietary cultivars produced for the domestic and export seed markets. Lucerne has the most registered cultivars (70), followed by sub-clover (45 across three subspecies), white clover (30), barrel medic (16), red clover (13), yellow serradella (11) and common vetch (10). Fifteen species have only a single registered cultivar.

During 2012 the Australian Seed Federation Pasture database presented information relating to 185 commercial planting seed products representing the public and proprietary sector derived pasture legume species marketed by various seed companies for the temperate pasture seed market in south-eastern Australia and south-west WA (Figure 14).

**Figure 14: Number of public and proprietary temperate legumes planting seed products available by species – based on number of products listed with the ASF database. (2013)**

Of the current range of temperate legume products available for planting the major market share is dominated by proprietary products which have been derived from public and private sector breeding programs (Figure 15). Increasingly, public sector bred proprietary products are marketed through licensing arrangements with private sector seed companies. It should be noted that although proprietary products dominate in terms of the number of products available, this does not reflect the actual area (i.e. market share) planted in public and proprietary products.

---

16 Cultivars are either listed in the Registrar of Australian Herbage Plant Cultivars (Oram 1990), the Australian Plant Breeders Rights database (IP Australia 2012), or described in Nichols et al. (2007).
Future demand for temperate legume pasture seed within the Australian domestic market will be driven by a combination of the following factors:

1. the current and future status of Australian temperate pastures containing temperate legume species, both in terms of quality and quantity;
2. the capacity of current pastures incorporating temperate pasture legumes to meet livestock demand for pasture-based nutrition; and
3. the likelihood of livestock producers to undertake pasture renewal in order to increase the livestock carrying capacity (i.e. quantity and quality) of their pastures to meet the demand for pasture-based nutrition.

During 2011, MLA commissioned a survey of the pasture feed base within south-eastern Australia and south-west WA. The purpose of the survey-based audit was to map and analyse information about the composition and ‘health’ status of the pasture feed base used for livestock production across these areas.

The survey estimated there was 122.78M ha of rangelands within these environments, of which 75.36M ha (61.38%) was used for grazing livestock and of this 50.44M ha had been sown to improved pasture species. The remainder of the available pasture (24.92M ha) was either improved (for example, fertilised or oversown) or unimproved native pasture (Table 4).
Table 4: Area, composition and status of pasture available for livestock grazing in south-eastern Australia and south-west WA. (MLA, 2012)

<table>
<thead>
<tr>
<th>State</th>
<th>Total area (M ha)</th>
<th>Grazing area (M ha)</th>
<th>Improved pasture area (M ha)</th>
<th>Unimproved native area (M ha)</th>
<th>Over-sown native area (M ha)</th>
<th>Fertilised native area (M ha)</th>
<th>Area of pasture in decline (M ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>61.74</td>
<td>49.75</td>
<td>27.19</td>
<td>22.55</td>
<td>1.36</td>
<td>1.04</td>
<td>7.01</td>
</tr>
<tr>
<td>Victoria</td>
<td>12.36</td>
<td>7.39</td>
<td>7.01</td>
<td>0.37</td>
<td>n.a.</td>
<td>0.06</td>
<td>0.80</td>
</tr>
<tr>
<td>SA</td>
<td>13.47</td>
<td>7.57</td>
<td>5.82</td>
<td>1.74</td>
<td>n.a.</td>
<td>n.a.</td>
<td>4.34</td>
</tr>
<tr>
<td>WA</td>
<td>33.56</td>
<td>9.46</td>
<td>9.46</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>3.18</td>
</tr>
<tr>
<td>Tasmania</td>
<td>1.64</td>
<td>1.18</td>
<td>0.95</td>
<td>0.24</td>
<td>n.a.</td>
<td>n.a.</td>
<td>0.44</td>
</tr>
<tr>
<td>Total</td>
<td>122.78</td>
<td>75.36</td>
<td>50.44</td>
<td>24.92</td>
<td>n.a.</td>
<td>n.a.</td>
<td>15.80</td>
</tr>
<tr>
<td>Total (%)</td>
<td>61.38%</td>
<td>66.93%</td>
<td>33.07%</td>
<td></td>
<td>20.97%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Of concern to the livestock and pasture-based grazing industry is the estimate that of the improved and native pasture available for livestock production about 15.80 Mha was estimated to be in decline (20.97%).

The decline in the pasture feedbase available for livestock production has been primarily driven by:

- the impact of the extended drought resulting in a loss of permanent, native and self-sown pasture;
- the loss of perennial and annual pastures seed banks, in particular temperate legume species as a result of weed control undertaken in the cropping phase;
- the decline in the value of livestock products, which reduced the impetus for pasture renewal;
- the attitude of livestock producers to accept the ‘status quo’ in terms of their current pastures, primarily due to their lack of confidence in establishing a ‘new’ pasture and the risk and cost of failure; and
- the increasing value and adoption of cropping as an alternative enterprise for traditional livestock producers.

Consistent with the decline in the area of pasture available for grazing, the size of the beef and dairy herds together with the sheep flock size within each State, declined during the same period. However, ABARE\(^{19}\) reported that the prospects for the beef, sheep and grains industries within the temperate pasture and grain-growing regions of south-east Australia and south-west WA had been remarkably transformed due to the improved climatic conditions experienced since the end of 2009. Heavy falls of rain across south-eastern Australia dramatically improved soil moisture and pasture conditions and water storage levels, resulting in improved irrigation water allocations in the short to mid-term for crop and pasture production along the Murray–Darling irrigation system.

The breaking of the drought together with a range of macro and micro changes within agriculture has led to a reversal in the decline of livestock numbers to a point where herds and flocks are forecast to grow conservatively out to 2018 and possibly beyond.

Based on ABARE\(^{20}\) projections for an increase in beef cattle numbers (3.0% p.a.) it is estimated between 2011 and 2018 that the cattle herd within south-east Australia and south-west WA could increase cumulatively by about 2.59M cattle and calves (Figure 16).

---


\(^{20}\) ABARE 2013, Agricultural Commodities: March quarter 2013. CC BY 3.0.
For the same period ABARE has forecast that within south-east Australia and south-west WA the growth of the dairy herd is expected to increase by an average of 1.3% p.a. and the sheep flock to increase by 1.0% p.a.

These estimates correlate to a dairy herd increase of an incremental 228,000 dairy cows and calves per year (Figure 17), and a sheep flock increase of an incremental 5.00M sheep and lambs per year (Figure 18).

Figure 16: Beef cattle herd numbers for south-east Australia and south-west WA

Figure 17: Dairy cattle herd numbers for south-east Australia and south-west WA (2008–2018)
As a result of these projections, the additional number of livestock (beef, dairy, and sheep) requiring the provision of pasture-based nutrition will increase from a projected incremental 1.06M head during 2012 to a total of 8.23M head in 2018 (Figure 19).

The incremental feedbase required to meet the nutritional requirements of the extra beef and dairy cattle and calves, together with the incremental sheep and lambs will need producers to adopt one or more of the...
following feedbase strategies, each of which may include the use of temperate legume pasture species as a component of the pasture composition:

- the replacement of current pasture species with ‘new’ high-performing pasture species;
- the reintroduction of permanent and/or semi-permanent pastures to replace crop rotations established during drought years;
- the replacement of current declining pastures (quantity and quality) with perennial and annual pasture species;
- the replacement of native and or self-sown pastures with the planting of perennial and annual pasture species;
- the use of short-rotation high-energy pastures to meet key feed gaps during the year;
- the planting of fodder crops for grazing and/or fodder conservation; and
- the application of fertilisers to native and self-sown pastures to generate incremental feed increases.

Underpinning the successful adoption of one or more of these strategies is the need for the pasture seed industry and livestock industry stakeholders to recognise that it will be mutually beneficial for all stakeholders to collaborate and generate the necessary R, D & E to meet their respective objectives.
Appendix 3: Consultation Feedback

Temperate legume pasture seed industry stakeholder consultation feedback on suggested priorities for the Five-Year R, D & E Plan (2013–18)

<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Priorities for the Five-Year R, D &amp; E Plan (2013–18)</th>
</tr>
</thead>
</table>
| Seed growers    | • The number one priority in the Lucerne Australia grower survey was a majority support for research into “Pollination: self-pollinating bees and/or impact of wild bees”.  
• To remain profitable and incentivised to continue to grow pasture seed, growers want to see greater emphasis placed on seed yield in plant breeding programs (for example, Mintaro/Monty replacements for Trikalla raised yields by 200-300kg/ha)  
• Need to do more promotion to end users regarding the importance of planting quality seed (i.e. certified vs uncertified) and benefits relating to pasture and livestock production from its use.  
• There is a need for increased water use efficiency in temperate legume pasture species — the increasing cost and decreasing reliability of access to water impacts on the profitability and economics of seed production vs alternative crops.  
• Weed control is a key focus due to changing weed spectrum and the increase in herbicide-tolerant weeds. There is a need for more weed control research, particularly with the onset of herbicide resistance in weeds such as annual ryegrass and milk thistle and the contamination of seed crops with previous species or varieties.  R & D should focus on identifying the range of herbicide options available, options for tank mixing herbicides for increased efficacy and tolerance of new species/varieties to herbicides.  
• With the increase in new technologies for pasture seed production R & D needs to assess:  
  • The life of rhizobium in the soil under different agro-ecological environments and seed production management systems.  
  • The effectiveness and cost: benefit of various seed treatments and coatings.  
  • The effectiveness and cost: benefit of novel endophytes.  
• Targeted R & D for the lucerne industry:  
  • Nutrition packages for lucerne with a focus on micro nutrients and alternative fertilisers.  
  • Strategies for reducing energy costs.  
  • Pest control (for example, Varrora Mite - *Varrora destructor*).  
  • Pollination (for example, contribution of honey bees versus native/feral bees to pollination).  
  • Verification of the impact of planting date and lock-up date on seed yield.  
  • Sward management for maximum seed set.  
• Agronomists providing advice to seed growers need better training in relation to agronomy-related recommendations or options and management practices. |
<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Priorities for the Five-Year R, D &amp; E Plan (2013–18)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant breeders</strong></td>
<td>• Focus on breeding that will:</td>
</tr>
<tr>
<td></td>
<td>• enhance yield (i.e. t/ha, gross herbage),</td>
</tr>
<tr>
<td></td>
<td>• enhance quality (i.e. crude protein, digestibility),</td>
</tr>
<tr>
<td></td>
<td>• assist in production (for example, water use efficiency, agronomy package),</td>
</tr>
<tr>
<td></td>
<td>• assist harvesting of seed (for example, reduce lodging),</td>
</tr>
<tr>
<td></td>
<td>• differentiate characteristics required for aerial sowing versus drill sowing (for example, &gt;soft pods, &gt;self-seeding, &gt; seed yield, &gt;ease of harvest – erect plants), and</td>
</tr>
<tr>
<td></td>
<td>• provide new product and market options.</td>
</tr>
<tr>
<td><strong>Seed processors / seed sampling and testing</strong></td>
<td>• Due to losses as a result of poor harvesting technique there is a need for increased education of harvest operators (contract and owner-operator) with regard to harvester set-up.</td>
</tr>
<tr>
<td></td>
<td>• The opportunity exists for investment in R &amp; D that is focused on the management required post-farm gate to reduce losses along the supply chain and deliver quality seed to end users.</td>
</tr>
<tr>
<td></td>
<td>• To remain competitive with global trends and to meet increased export phyto requirements from export countries the industry needs to invest in R &amp; D to adopt ‘global best practice’ procedures and methodology for seed sampling and testing (for example, the use of photo-electric cells for use in larger shipments.).</td>
</tr>
<tr>
<td></td>
<td>• To improve production seed preparation for harvest and processing seed growers need access to moisture meters specifically calibrated to pasture seed species and production systems.</td>
</tr>
<tr>
<td></td>
<td>• To improve testing and the certification process invest in R &amp; D focused on the use of genetic markers, which identify genetic purity.</td>
</tr>
<tr>
<td></td>
<td>• The seed industry requires a concerted effort to invest in R &amp; D that will lead to innovations in more user friendly harvester equipment (i.e. O, H &amp; S and environment) and enhances yield by way of reducing loss through the harvest process. Implicit in this R &amp; D is the need to invest in up-skilling harvest equipment operators.</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Seed companies and marketers | • To remain profitable and incentivised to produce quality seed, seed companies want to see greater emphasis placed on seed yield in plant breeding programs (for example, Mintaro/Monty replacements for Trikalla raised yields by 200-300 kg/ha)  
• The increasing need for seed growers to adopt ‘world best practice’ in relation to seed production agronomy (i.e. lucerne — sowing rates/ time of planting/lock-up) requires regional production agronomy research and grower education (i.e. SE SA versus Nth. East Vic/Sth. NSW);  
• Key areas of agronomy management requiring continued R & D investment:  
  • Weed control — due to impact on production, yield and quality of sample presented. (e.g. Golden Dodder in lucerne, Seteria) Need to develop weed control options for herbicide-resistant weeds, especially in white/strawberry/sub-clover due to position in crop rotation. Investigate development of Permit Use Registrations for off-label herbicide use in pastures seed crops, especially as a result of losing access to Diuron for weed control in pasture seed crops.  
  • Harvesting — due to impact on yield and the quality of sample presented (i.e. damaged seed).  
  • Pest control — due to impact on production and yield.  
  • Nutrition — identify changes to plant nutrition requirements by species as a result of changes in agro-ecological impacts (for example, changes in soil pH, aluminium toxicity, salt concentration).  
  • Grazing management for improved establishment and seed yield.  
• There is a need for an industry-based co-ordinating body, which prioritises and delivers seed production R & D to industry stakeholders (for example, Foundation for Arable Research — NZ).  
• The seed industry requires a concerted effort to invest in R & D that will lead to innovations in more user friendly harvester equipment (i.e. O, H & S and environment) and enhances yield by way of reducing loss through the harvest process. Implicit in this R & D is the need to invest in up-skilling harvest equipment operators. |
<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Priorities for the Five-Year R, D &amp; E Plan (2013–18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry representative organisations</td>
<td>• Lucerne Australia (Lucerne Australia Strategic Plan 2010)</td>
</tr>
<tr>
<td></td>
<td>• Use industry expertise and membership to identify, determine and focus research priorities.</td>
</tr>
<tr>
<td></td>
<td>• Work with funding and research bodies to develop a commissioned research approach.</td>
</tr>
<tr>
<td></td>
<td>• Optimise research outcomes for investment dollars.</td>
</tr>
<tr>
<td></td>
<td>• Assist other research organisations to focus their efforts to optimise research outcomes for the lucerne seed and related industries.</td>
</tr>
<tr>
<td></td>
<td>• Work closely with Lucerne Australia’s nominated representative on the RIRDC pasture seed subcommittee.</td>
</tr>
<tr>
<td></td>
<td>• Australian Fodder Industry Association</td>
</tr>
<tr>
<td></td>
<td>• Improved crop and pasture varieties.</td>
</tr>
<tr>
<td></td>
<td>• Plant diseases, weed and pest control.</td>
</tr>
<tr>
<td></td>
<td>• Harvesting and processing technologies.</td>
</tr>
<tr>
<td></td>
<td>• Storage and handling methods.</td>
</tr>
<tr>
<td></td>
<td>• Developing new markets.</td>
</tr>
<tr>
<td>Industry sector</td>
<td>Priorities for the Five-Year R, D &amp; E Plan (2013–18)</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------</td>
</tr>
</tbody>
</table>
| Industry peak bodies | • GPA – Pasture Seed Group  
  • Increase market appreciation of seed growers’ commitment to producing quality seed for the industry.  
  • Increase awareness of the value quality seed production contributes to pasture and livestock performance.  
  • Increase market appreciation of the contribution (value) of ‘good pastures’ to livestock production, both as feed and fodder.  
  • Identify and develop opportunities to either form alliances or partnerships with industries and/or organisations for the purpose of more effective, economic and efficient generation and delivery of prioritised R & D to seed growers.  
  • Need to continue to develop and introduce high-performing temperate legume pasture varieties that generate benefits for seed growers (for example, higher seed yield) and livestock producers (for example, higher energy content).  
  • Improve the decision-making process for seed growers through the generation and effective delivery (i.e. communication) of prioritised-outcome driven R & D that encompass new emerging technologies for production, harvesting and processing planting seed.  
  • Encourage the development of new products and markets (domestic and export) for seed growers to target.  
  • Work towards sustainable production systems based on meeting objectives related to economic, environmental, social and cultural outcomes.  
  • Build the pasture seed industry knowledge base by way of the introduction of appropriate training related to seed production activities (for example, QA processes) and related areas (for example, O, H & S). |
<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Priorities for the Five-Year R, D &amp; E Plan (2013–18)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government R, D &amp; E agencies.</strong></td>
<td><strong>• DAFF – Rural Research and Development Priorities (2011)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Productivity and adding value:</strong> Improve the productivity and profitability of existing industries and support the development of viable new industries.</td>
</tr>
<tr>
<td></td>
<td><strong>• Supply chain and markets:</strong> Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole supply chain, including to consumers.</td>
</tr>
<tr>
<td></td>
<td><strong>• Natural resource management (NRM):</strong> Support effective management of Australia’s natural resources to ensure primary industries are both economically and environmentally sustainable.</td>
</tr>
<tr>
<td></td>
<td><strong>• Climate variability and climate change:</strong> Build resilience to climate variability and adapt to and mitigate the effects of climate change.</td>
</tr>
<tr>
<td></td>
<td><strong>• Biosecurity:</strong> Protect Australia’s community, primary industries and environment from biosecurity threats.</td>
</tr>
<tr>
<td></td>
<td><strong>• Supporting the rural research and development priorities:</strong> Improve the skills to undertake research and apply its findings. Promote the development of new and existing technologies.</td>
</tr>
<tr>
<td></td>
<td><strong>• Productivity growth is required to support rural industry profit and sustainability.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Build evidence about emerging issues impacting on the rural sector.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Ensure new industry (and innovation) potential is rigorously explored and the knowledge is shared.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Support rural industries consistent with the life-cycle approach.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Address cross-sector R, D &amp; E needs through collaboration.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Support new industries.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Maintain and build rural research capacity.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Invest in rural sector people.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>• Enhance the adoption of R, D &amp; E.</strong></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **RIRDC Pasture Seed Committee (Five-Year R & D Plan 2008–13)** | • Industry communication and capacity building.  
• Improved seed production and processing technologies.  
• Environmentally sustainable seed production systems.  
• Monitor, evaluate and adopt emerging sciences and technologies.  
• Develop new pasture seed products, markets and farm systems. |
| **RIRDC Fodder Crops Program (Five-Year R & D Plan 2008–13)** | • Markets, products and ‘blue sky’ research.  
• Plant breeding and germplasm evaluation.  
• Crop agronomy and fodder production efficiency.  
• Supply chain efficiency harvesting, transport, traceability and relationships with allied industries.  
• Improved quality of fodder.  
• Climate change, biosecurity and environmental management.  
• Industry linkages, communication, information flows, forecasting tools.  
• Program evaluation. |
Appendix 4: Program Review

This review of the existing RIRDC Pasture Seeds Five-Year R & D Program (2008 – 2013) is drawn from a recently completed project carried out by Agridata Research (April 2013). The primary purpose of the review was to ascertain if, and to what extent, benefits have accrued from program investment.

Summary

During May 2008 an Evaluation Framework for RIRDC was finalised. This framework, among other things, sets out a process for reviewing each of RIRDC’s programs in the final year of its five-year plan. One of the two programs selected for assessment in 2012–13 was the Pasture Seeds Program.

Up until and including 2011, a part of each specific program review was to select randomly three independent project investments within a program for an impact evaluation through a cost: benefit analysis. The three economic analyses provided specific case studies that demonstrated the extent and distribution of benefits that have been, are being, or will be, captured in the future. Such information was valuable to not only RIRDC management, but also to the members of the industry (or industries) at which the investment had been targeted.

For the current review, information was assembled for the population of projects in the Pasture Seeds Program that were completed during the past five years. Information on each project was assembled from any of the original project proposals, final reports, and any progress reports or other relevant publications. Assistance was rendered by RIRDC Program personnel, project principal investigators, industry personnel and others. The potential benefits from each investment were identified and described in a ‘triple bottom line’ context. Some of the benefits considered the most significant were then valued.

There was a wide range of expected benefits identified in the projects, predominantly economic in nature, and a number of these benefits were valued. Funding for the projects classified as making significant impact totalled $1.75M (present value terms) and produced aggregate total expected benefits of $7.39M (present value terms). This gave a net present value of $5.64 million, a benefit: cost ratio of 4.22:1 and an internal rate of return of 19.8%.

When the benefits for the significant impact projects were compared with the total investment in all projects in the population, this lowered the investment criteria. Funding for all projects in the population totalled $4.23M (present value terms). When compared with the same value of benefits as for the first analysis ($7.39M), this investment produced a NPV of $3.16M, a benefit: cost ratio of 1.75:1 and an internal rate of return of 9.9%.

The positive results in terms of both the number and range of benefits identified and valued demonstrate the Program is delivering significant impacts and is providing a healthy return on investment.

Background

RIRDC’s Pasture Seeds Program is aimed at facilitating a profitable and sustainable pasture seed industry with a reputation for a reliable supply and quality of seed supplied domestically and internationally.

The key objectives of the RIRDC Pasture Seeds R & D Plan (2008–2013) were to:

- Increase communication and capacity building in the pasture seed industry.
- Improve seed production and processing technologies to lift pasture seed production efficiency (including water use and adapting to climate variability), yield, quality, pest/disease management and processing ease.
- Ensure the industry has environmentally sustainable seed production systems available.
• Monitor, evaluate and adopt emerging sciences and technologies to ensure the opportunities, implications and risks of newly-emerging sciences, technologies and research results are understood and opportunity is provided for their adoption in the seed industry.

• Develop new pasture seed products, markets and farm systems.

One of the characteristics of most RIRDC Programs is a wide diversity of outcomes as projects address a wide range of subprogram areas and issues. For example, with pasture seed, there may be projects associated with sub-clover, white clover, lucerne, medics etc with different species relevant to different ecological zones and farming systems. Further, within each species, there may be projects addressing agronomy, pests, diseases and abiotic factors, to name just a few. This can make valuations of projects difficult and time consuming.

To address the diversity of projects, a select few were chosen for valuation of benefits based on the extent of ‘impact’ reported in the above descriptive process. A demonstrated strong linkage between project and impact was also a characteristic of projects where benefits were quantified. Availability of data also influenced which benefits were valued. The size and value of the final population included in the analysis is shown in Table 5, along with the classification of projects according to the objective of the Pasture Seeds R & D Plan.

Table 5: Number and value of RIRDC projects in the population by R & D plan objective

<table>
<thead>
<tr>
<th>Objectives of the Pasture Seeds R &amp; D Plan</th>
<th>No. of projects</th>
<th>Value of projects ($)</th>
<th>Percentage of total value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing new pasture seed products, markets and farm systems</td>
<td>1</td>
<td>5,000</td>
<td>0.14</td>
</tr>
<tr>
<td>Environmentally sustainable seed production systems</td>
<td>2</td>
<td>763,810</td>
<td>22.05</td>
</tr>
<tr>
<td>Improved seed production and processing technologies</td>
<td>10</td>
<td>1,513,512</td>
<td>43.69</td>
</tr>
<tr>
<td>Industry communication and capacity building</td>
<td>2</td>
<td>433,701</td>
<td>12.52</td>
</tr>
<tr>
<td>Monitoring, evaluating and adopting emerging sciences and technologies</td>
<td>2</td>
<td>748,293</td>
<td>21.60</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>3,464,316</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The following table (Table 6) shows the annual investment by both RIRDC and for researchers and other investors.
Table 6: Annual investment in RIRDC Pasture Seeds Program

<table>
<thead>
<tr>
<th>Year ending June</th>
<th>RIRDC</th>
<th>Researchers and Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>12,090</td>
<td>26,469</td>
<td>38,559</td>
</tr>
<tr>
<td>2006</td>
<td>63,598</td>
<td>24,849</td>
<td>88,447</td>
</tr>
<tr>
<td>2007</td>
<td>140,978</td>
<td>118,380</td>
<td>259,358</td>
</tr>
<tr>
<td>2008</td>
<td>295,500</td>
<td>475,536</td>
<td>771,036</td>
</tr>
<tr>
<td>2009</td>
<td>411,785</td>
<td>409,022</td>
<td>820,807</td>
</tr>
<tr>
<td>2010</td>
<td>141,505</td>
<td>292,817</td>
<td>434,322</td>
</tr>
<tr>
<td>2011</td>
<td>159,787</td>
<td>481,432</td>
<td>641,219</td>
</tr>
<tr>
<td>2012</td>
<td>117,874</td>
<td>292,695</td>
<td>410,569</td>
</tr>
<tr>
<td>Total</td>
<td>1,343,116</td>
<td>2,121,200</td>
<td>3,464,316</td>
</tr>
</tbody>
</table>

Impacts and benefits

Table 7 summarises the contributions to the principal benefits and impacts delivered by each of the projects. Projects are identified as contributing to one or several of the benefits and the foreseen impact is represented as follows:

- Significant impact: ✐ ✐ ✐
- Some impact: ✐ ✐
- Minor or undetermined impact: ✐

Some benefits have been delivered against all five objectives of the plan. Three of the five objectives (2, 4 and 5) are addressed by projects with at least one high impact. The objective with the highest rating for impact is ‘Improved seed production and processing technologies’ with 3 of the 7 projects rated as having a significant impact.

Some projects were assessed as contributing to more than one of the objectives, for example PRJ-000776 has some environmental benefits as well as providing high-impact benefits to the improved seed production objective. Table 8 provides a categorisation of all identified benefits according to 'triple bottom line' categories.
Table 7: Summary of benefits/impacts from individual pasture Seed projects

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Increased yield/avoided yield loss</th>
<th>Reduction in input costs</th>
<th>Increased profitability from industry expansion</th>
<th>Improved demand</th>
<th>Decrease in adverse environmental impacts from production</th>
<th>Increased scientific and industry capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRJ-000023</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-000024</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-000030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-000478</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-000561</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-000776</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PRJ-000813</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-002381</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PRJ-002388</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PRJ-003241</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-003521</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-004046</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-004243</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-005491</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-005657</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-005738</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRJ-006283</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8: Triple bottom line categories of benefits from the program investment

<table>
<thead>
<tr>
<th>Levy paying industry</th>
<th>Spill overs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other industries</td>
</tr>
<tr>
<td>ECONOMIC BENEFITS</td>
<td></td>
</tr>
<tr>
<td>• Increased yields/avoided yield loss</td>
<td>• Increased productivity of some grazing and cropping industries from improved pasture seed varieties</td>
</tr>
<tr>
<td>• Reductions in input costs</td>
<td></td>
</tr>
<tr>
<td>• Potential expansion of pasture seed industries</td>
<td></td>
</tr>
<tr>
<td>• Increased scientific capacity and industry capacity</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL BENEFITS</td>
<td></td>
</tr>
<tr>
<td>• Decreased adverse environmental impacts on farm from (avoided wind and water erosion)</td>
<td>• Decreased environmental impacts off farm (from wind and water erosion, chemical export)</td>
</tr>
<tr>
<td>SOCIAL BENEFITS</td>
<td></td>
</tr>
<tr>
<td>• Decreased association with chemicals by farm workers</td>
<td>• Increased scientific capacity</td>
</tr>
</tbody>
</table>

From the classification of benefits in Tables 7 and 8, five projects were identified as having benefits with significant impacts. The following five projects therefore were subject to individual analysis:

• PRJ-000478: Establishing a seed scheme for mixed varieties of subterranean clover
• PRJ-000776: Irrigation best management practices for white clover production
• PRJ-002388: Development and use of diagnostic tools for red leaf sub clover disease
• PRJ-003521: Molecular tools for boron tolerance in annual medics
• PRJ-005491: Setaria trial

Common characteristics of projects not valued are as follows:

• Difficulty in measuring benefits due to lack of industry data.
• A perceived weak linkage between project findings and impact.
• Projects were at the 'proof of concept' stage, with significant future uncertainties for measuring benefits.
• Outputs from projects are not anticipated to lead to further research or any impacts.

The aggregate present value of the benefits from these five projects was compared with the aggregate investment in the five projects generating the benefits. This process is likely to estimate a maximum value.
set of investment criteria for the overall Program investment, as it unlikely the projects where benefits were not valued would provide the same cost: benefit ratios.

Investment in the five projects where benefits were valued totalled $1.75M (present value terms) and produced aggregate total expected benefits of $7.39M (present value terms). This gave a NPV of $5.64M, a benefit: cost ratio of 4.22:1 and an internal rate of return of 19.8%.

The second analysis refers to the same set of valued benefits from the five projects but compares them to the total investment in the Program population, the 17 projects. As there are likely to be at least some positive benefits from the projects where benefits were not explicitly valued, the results from the second analysis are likely to represent a minimum value set of investment criteria for the Program.

Investment in all 17 projects in the population totalled $4.23M (present value terms). When compared with the same value of benefits as for the first analysis ($7.39M), this investment produced a NPV of $3.16M, a benefit: cost ratio of 1.75:1 and an internal rate of return of 9.9%.

There were potential benefits identified from eight of the other 12 projects where values could have been attributed to the investment. These projects included:

- Agronomic support packages for raised bed lucerne seed production
- Management of bacterial wilt of lucerne
- Investigation of the impact of toad rush (*Juncus bufonius*) on sub-clover
- Irrigation for the future
- Polymer adhesives and colourants used in pre-inoculated legume pasture seed
- Duncan Heazlewood — Hugh Roberts pasture Seeds R & D travel award 2008–09
- A standard contract for the pasture seed industry
- A collection of early flowering *T. subterraneum* ssp. *brachycaulcinium* overseas

Reasons for not valuing these projects include a lack of industry data making for difficulties in valuation, a weak linkage between impact and project and an envisaged small or insignificant impact. The remaining projects were considered not to have produced any direct industry benefits, but may have contributed indirectly to either science or industry capacity.

Benefits were delivered against all of the objectives stated in the Five-Year R & D Plan (2008–13). The objective with the largest assessed impact was Objective 2: ‘Improved seed production and processing technologies’. Three of the five projects assessed as delivering high-impact benefits addressed this objective.

The positive results in terms of both the number and range of benefits identified demonstrate the Program is delivering significant impacts and is providing a healthy return on investment. The overall result should be heartening for RIRDC, the industry, and policy personnel responsible for allocation of public funds. Although only benefits from five projects were valued, these benefits were assessed as covering the investment costs of all 17 projects in the population.
Appendix 5: SWOT Analysis

Strengths

- Low costs of production of legume seed compared with most other regions (although NZ and USA grass and white clover production is less expensive).
- Out-of-season production for northern hemisphere customers enables more timely delivery of new season seed, which translates to ‘just-in-time supply’ advantage and lower inventory costs.
- Australia is relatively clean of the major pests and diseases that restrict temperate pasture legume seed production in some regions.
- Extensive use of seed certification schemes (for example, OECD, AOSCA, ASA) which are underpinned by the application of strong QA systems, supported by ISTA recognised laboratories.
- Globally well respected by customers as a provider of quality temperate pasture legume seed.
- Broad base of temperate pasture legume pasture seed production regions provides a buffer against climatic effects of drought, winds, floods, pest infestations etc.
- Established infrastructure for collection and investment of levies in R, D & E.

Weaknesses

- Lack of industry-wide approach to adopt ‘world best practice’ management systems for pasture seed production.
- Lack of specialist sub-clover seed growers limits production of quality seed for the market.
- Large range in capability of seed growers, from dedicated professionals to part time or seasonal opportunists, has led to a lack of supply and continuity in the quality of seed produced.
- Lack of Federal and State government awareness of the size and value of the temperate pasture legume seed industry, both in terms of its contribution to livestock and fodder production in the domestic market and the generation of export revenues from the sale of planting seed into a range of global markets.
- Poor understanding by the livestock and fodder industries of the value, size and capacity of the temperate pasture legume seed industry.
- Australian seed production areas are more susceptible to adverse conditions than many other production regions globally.
- Poor reputation as an industry in being able to set and meet production forecasts and contracts for domestic and export markets.
- Inability to collectively develop a strong industry to exploit domestic and global opportunities for temperate pasture legume seed.
- Lack of temperate pasture legume seed industry national representation for seed growers.
- Low level of industry/government investment in key R, D & E areas such as agronomy, yield improvement and adoption of ‘global industry best practice management guidelines’.
- Little investment in harvesting and processing technologies to improve cleaning percentages or aid in removal of difficult weeds or weeds unacceptable for export standards.
- Declining level of certification of temperate legume pasture planting seed for the domestic market has led to a significant reduction in levies generated and available for investment in R, D & E related to seed production and processing.
• Lack of continuity in the application of levies to certified and non-certified temperate pasture legume seed produced for the domestic and export markets.
• Lack of strategic partnerships and alliances within the temperate legume pasture seed industry with beneficiaries of temperate legume pasture seed production (for example, dairy, beef, sheep, fodder).
• Loss of plant breeding and seed production expertise from the public and private sector, leading to a generational loss of knowledge relating to temperate legume pasture seed R, D & E.
• As a result of government restructuring and reallocation of resources there has been a loss of public sector resources and infrastructure to support temperate pasture legume seed ‘pre-commercial’ R, D & E.

Opportunities

• To enhance the value of the R, D & E levies available from strategic alliances and partnerships with:
  o industry beneficiaries of temperate legume pasture seed production including
    ▪ Dairy Australia
    ▪ MLA
    ▪ AWI
  o research institutions such as
    ▪ Dairy Futures CRC
    ▪ Future Farm Industries CRC
  o international institutions undertaking seed production research;
    ▪ Foundation for Arable Research (NZ)
    ▪ Nobel Foundation (USA)
• To form strategic alliances and partnerships with private sector partners (i.e. seed companies, seed processors) to form mutually-beneficial co-investments in seed production related R, D & E;
  o Yield improvement
  o Agronomy packages
  o Harvesting efficiency
  o Environmental management
• To increase yield potential through R, D & E investment into seed yield improvements for all temperate pasture legume species.
• To establish the infrastructure for representation of temperate legume pasture seed growers in the development of national policies that foster a strong, innovative, profitable, globally-competitive and environmentally-sustainable temperate legume pasture industry in Australia.
• To increase investment into working with growers and seed marketers, which is focused on expanding the industry through:
  o the adoption of ‘global industry best practice management guidelines’,
  o increasing the awareness of Australian livestock and fodder producers in the temperate regions of Australia of the benefits of investing in pasture renewal based on the use of high-quality certified temperate legume pasture species produced in Australia,
  o increasing the awareness of international markets about the quality of Australian-produced temperate legume pasture seed; and
  o increasing the temperate legume pasture seed industry capacity to supply seed for emerging economies such as China, India and Africa, which are focused on increasing their demand for animal protein as their affluence increases.
• Potential for increase in pasture improvement domestically as increased demands for livestock on farm to assist with herbicide resistance management.

• To invest in the development and adoption of innovative technologies for use in the development, production and processing of temperate legume pasture seed, for example:
  o use of genetic markers for selection of traits of interest (for example, yield, abiotic and biotic stress);
  o introduction of GM traits for:
    ▪ targeted pests (e.g. insects, weeds, disease);
    ▪ nutrient and water use efficiency;
    ▪ animal health (e.g. bloat control);
  o use of plant breeding techniques such as genomics, transgenesis, molecular markers and mutation breeding for improved forage quality.

• Enable the access to pre-basic and basic seed of public lucerne varieties by seed growers to maintain seed reserves and re-establish access to markets lost through the loss of access to these varieties.

• Become more competitive with NZ production for export of temperate pasture legume seed into EU and the US as FOREX rates bring AUD closer to NZD.

Threats

• The continued decline in domestic market pasture renewal rates and the use of certified proprietary temperate legume pasture seed will lead to a loss of incentive to invest in R, D & E by public and private sector stakeholders.

• The continued dominance of low cost–low performing temperate pasture legume ‘common’ varieties as the corner stone of the temperate pasture feedbase for livestock production in south-eastern Australia and south-west WA in preference to the adoption of high-performing proprietary certified temperate pasture legume varieties.

• The continued lack of adequate public and private sector investment in R, D & E increases the risk of:
  o production systems falling behind overseas competitors, threatening domestic and export market access based on loss of economic competitiveness, and
  o the potential loss of production due to the introduced and infestation of exotic and non-exotic weeds, pests or diseases on key species and production regions.

• Maintain current industry status as a result of the lack of industry-wide cooperation and coordination of R, D & E activities across all temperate legume pasture species.

• The continued lack of an equitable levy scheme (i.e. certified and uncertified planting seed) to raise revenues for investment into a meaningful temperate legume pasture industry R, D & E program.

• Lack of continuity in supply of seed to meet forecasts established by seed marketers for both the domestic and export markets.

• Large fluctuations in yields due to climatic effects and infestations of problem pests and diseases.

• Loss of production due to the introduction and infestation of exotic and non-exotic weeds, pests or diseases on key species and production regions.

• Decline in the area of land available and suitable for seed production as a result of weed infestations, increases in crop rotations or the economic incentive to undertake pasture seed production relative to alternate agricultural production systems.
• The continued development of herbicide and insecticide resistance in key weeds and insects will reduce the capacity of seed growers to select paddocks for seed production.

• The continued illegal use of ‘off-label’ pesticides for the control of weeds, insects and diseases within temperate legume pasture seed production crops.

• Restrictions on availability of water for irrigation due to:
  o competition for supply with other agricultural industries,
  o increased cost for water access, and
  o environmental impacts.

• Lack of access to GM technologies (for example, herbicide and insect tolerance, bloat resistance, quality attributes) may risk potential yield gains reducing cost competitiveness and restrict future access to export markets where GM technology has been approved.

• The continued reduction in the number of experienced and dedicated seed growers could continue to limit the potential for the production of high-quality high-yielding seed and may inhibit seed industry expansion.

• Increasing impact of cropping systems restricting growers’ ability to making land available for dedicated seed production.

• Impact of potential O,H & S and environmental legislation restricting seed production activities such as sub-clover harvesting.

• Lack of awareness and impact of increased export phytosanitary requirements of importing countries may limit export potential and increase the number of rejected shipments.

• Adverse FOREX conditions leading to lower import costs for seed from competitive suppliers in countries such as the US and NZ;
Appendix 6: Future Funding Scenarios

Future Funding Scenarios for the RIRDC Pasture Seeds Program

The current RIRDC Pasture Seeds R, D & E program has been consistently addressing declining revenues. The pasture seeds industry as a whole, as well as the temperate legume sector, will need to consider whether it should:

1. Rely on industry sector ‘good will’ that initiates, funds and generates R, D & E outcomes for its own sub component of stakeholders with minimal levy support. This strategy runs the risk of some sectors not being well enough structured to initiate and manage R, D & E initiatives (for example, medics, sub-clover, serradella); or

2. Continue to deliver and meet the expectations of industry stakeholders through the RIRDC Pasture Seeds Program in which case it will need to consider and adopt strategies to increase the revenue pool available for allocation to the R, D & E program.

If the decision is to support the latter option, then there are a number of strategies the RIRDC Pasture Seeds Committee may need to evaluate and work with the industry to meet the obligations to stakeholders. These strategies may include, but not limited to, one or more of the following:

• Collaborate with third parties with a shared mutual interest in generating outcomes from the nominated objectives and have the capacity to contribute investment into the generation of the outcomes required (for example, beef, sheep and dairy industry stakeholders, planting seed industry stakeholders – seed companies and marketers);

• Collaborate with research institutions who have the resources, capacity and capability to integrate the proposed R, D & E projects into their current research programs and thus increase the economic efficiency in generating outcomes for delivery to industry stakeholders (for example, NZ Foundation for Arable Research, CRCs, DPIs, Universities);

• Collaborate with the ASF and industry stakeholders to promote the benefit of ‘ASA Certified Seed’ with an aim of increasing the adoption and use of certified seed, which will increase levies collected and invested into the R, D & E program (see Table 9);

• Given the outcomes of the RIRDC Pasture Seeds R, D & E program benefit the production of certified and non-certified temperate legume seed, collaborate with the ASF, GPA and ASA to restructure the levy collection system and broaden the base of collecting levies to include all commercially produced certified and non-certified seed (see Table 10);

• In collaboration with GPA and ASA increase the current RIRDC Temperate Pasture Legume Seed Levies (see Table 11);

• Through the establishment of collaborations with the ASF, GPA and ASA expand the range of legume species on which levies are collected to include temperate, sub-tropical and tropical legume species.
Table 9: RIRDC Pasture Seeds 2013-2018 five year R, D & E plan revenue & expenditure – Option one: Increase adoption of certified planting Seed

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Statutory Industry Levies21</td>
<td>$130,000</td>
<td>$162,500</td>
<td>$203,125</td>
<td>$253,906</td>
<td>$317,383</td>
</tr>
<tr>
<td>• DAFF Contribution22</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
</tr>
<tr>
<td>• All Other Revenue23</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$290,000</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$363,125</strong></td>
<td><strong>$413,906</strong></td>
<td><strong>$477,383</strong></td>
</tr>
</tbody>
</table>

**Allocation x Objective (%)**

| i) Markets                      | 15%      | 15%      | 15%      | 15%      | 15%      |
| ii) Capacity                    | 15%      | 15%      | 15%      | 15%      | 15%      |
| iii) Product Development        | 50%      | 50%      | 50%      | 50%      | 50%      |
| iv) Extension and Communication | 20%      | 20%      | 20%      | 20%      | 20%      |
| **Total**                       | **100%** | **100%** | **100%** | **100%** | **100%** |

**Allocation x Objective ($)**

| i) Markets                      | $43,500  | $48,375  | $54,469  | $62,086  | $71,607  |
| ii) Capacity                    | $43,500  | $48,375  | $54,469  | $62,086  | $71,607  |
| iii) Product Development        | $145,000 | $161,250 | $181,562 | $206,953 | $238,691 |
| iv) Extension and Communication | $58,000  | $64,500  | $72,625  | $82,781  | $95,477  |
| **Total**                       | **$290,000** | **$322,500** | **$363,125** | **$413,906** | **$477,382** |

---

21 Based on 2007/08 – 2010/11 average figures, the model assumes a 25% compound growth rate in the adoption of certified planting seed and payment of RIRDC Levies.
22 RIRDC Pasture Seeds Program Estimate (2013)
23 RIRDC Pasture Seeds Program Estimate (2013)
Table 10: RIRDC pasture Seeds 2013–2018 five year R, D & E plan revenue & expenditure – Option Two: Apply RIRDC pasture seed levy to all commercial planting seed production.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Statutory Industry Levies24</td>
<td>$227,815$25</td>
<td>$227,815</td>
<td>$227,815</td>
<td>$227,815</td>
<td>$227,815</td>
</tr>
<tr>
<td>• Federal Government Contribution26</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
</tr>
<tr>
<td>• All Other Revenue27</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$ 387,815.38</strong></td>
<td><strong>$ 387,815.38</strong></td>
<td><strong>$ 387,815.38</strong></td>
<td><strong>$ 387,815.38</strong></td>
<td><strong>$ 387,815.38</strong></td>
</tr>
</tbody>
</table>

Allocation x Objective (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Markets</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>ii) Capacity</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>iii) Product Development</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>iv) Extension and Communication</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Allocation x Objective ($)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Markets</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
</tr>
<tr>
<td>ii) Capacity</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
<td>$58,172</td>
</tr>
<tr>
<td>iii) Product Development</td>
<td>$193,908</td>
<td>$193,908</td>
<td>$193,908</td>
<td>$193,908</td>
<td>$193,908</td>
</tr>
<tr>
<td>iv) Extension and Communication</td>
<td>$77,563</td>
<td>$77,563</td>
<td>$77,563</td>
<td>$77,563</td>
<td>$77,563</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$387,815</strong></td>
<td><strong>$387,815</strong></td>
<td><strong>$387,815</strong></td>
<td><strong>$387,815</strong></td>
<td><strong>$387,815</strong></td>
</tr>
</tbody>
</table>

---

24 Based on pasture seed industry assessment of average temperate pasture legume planting seed market (domestic & export) = 20.61K mt generating $253,128 levies based on current RIRDC levies per species.
25 Assumes RIRDC levy capture rate of 90% on all temperate legume planting seed produced.
26 RIRDC Pastures Seeds Program Estimate (2013)
27 RIRDC Pasture Seeds Program Estimate (2013)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Statutory Industry Levies&lt;sup&gt;28&lt;/sup&gt;</td>
<td>$162,500</td>
<td>$162,500</td>
<td>$162,500</td>
<td>$162,500</td>
<td>$162,500</td>
</tr>
<tr>
<td>• Federal Government Contribution &lt;sup&gt;29&lt;/sup&gt;</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
<td>$110,000</td>
</tr>
<tr>
<td>• All Other Revenue &lt;sup&gt;30&lt;/sup&gt;</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
</tr>
</tbody>
</table>

Allocation x Objective (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Markets</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>ii) Capacity</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>iii) Product Development</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>iv) Extension and Communication</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Allocation x Objective ($)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Markets</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
</tr>
<tr>
<td>ii) Capacity</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
<td>$48,375</td>
</tr>
<tr>
<td>iii) Product Development</td>
<td>$161,250</td>
<td>$161,250</td>
<td>$161,250</td>
<td>$161,250</td>
<td>$161,250</td>
</tr>
<tr>
<td>iv) Extension and Communication</td>
<td>$64,500</td>
<td>$64,500</td>
<td>$64,500</td>
<td>$64,500</td>
<td>$64,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
<td><strong>$322,500</strong></td>
</tr>
</tbody>
</table>

---

<sup>28</sup> Assumes 25% increase in RIRDC levies on certified temperate legume pasture planting seed.

<sup>29</sup> RIRDC Pasture Seeds Program Estimate (2013)

<sup>30</sup> RIRDC Pasture Seeds Program Estimate (2013)
## Appendix 7: 2013-18 Pasture Seeds 5 Year Plan on a Page

### Enabling objective: Improved alignment between industry objectives and research and development outcomes (fostering alliances, collaborations and partnerships)

<table>
<thead>
<tr>
<th>Objective 1: Focus on growth of domestic and export pasture seeds markets (15%)</th>
<th>Objective 2: Improved industry capacity through skills and leadership training (15%)</th>
<th>Objective 3: Production and processing efficiency and improved sustainability (30%)</th>
<th>Objective 4: Improved industry knowledge with data, extension and communication (20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategies</strong></td>
<td><strong>Strategies</strong></td>
<td><strong>Strategies</strong></td>
<td><strong>Strategies</strong></td>
</tr>
<tr>
<td>• Complete high priority export market development RD&amp;E.</td>
<td>• Two potential industry leaders have benefited from Nuffield, ARLP, Horizon, Rural Women or similar.</td>
<td>• Biosecurity plan prepared with stakeholders by 2017.</td>
<td>• Prepare a comprehensive profile of the Aust pasture seeds industry and establish update protocols (components, values – domestic/export, market shares, capacity, pipeline, disruptive tech.).</td>
</tr>
<tr>
<td>• Review exports and scope export projects.</td>
<td>• Critical gaps in research capacity identified and filled by 2018.</td>
<td>• Assist in breeding and variety trials to deliver new temperate pasture legume varieties across two species by 2018.</td>
<td>• A competencies and capabilities report is available by 2016.</td>
</tr>
<tr>
<td>• Demonstrate the benefit of pastures, particularly certified temperate legumes, as part of the livestock feedbase and when undertaking pasture renewal.</td>
<td>• By 2018 there is a 10% increase in participation in SITAG training courses.</td>
<td>• Three global best practice guidelines prepared and distributed by 2018.</td>
<td>• Cost effective and partner aligned communication is achieved by 2017.</td>
</tr>
<tr>
<td><strong>Key Performance Indicators</strong></td>
<td>• International researchers are contributing to the pasture seed program.</td>
<td>• Agronomy – R&amp;D outputs inform global best practice guidelines by 2018.</td>
<td>• A communication strategy is produced with the industry by 2018.</td>
</tr>
<tr>
<td>• Two significant export development projects complete by 2018.</td>
<td><strong>Impact and Consequences</strong></td>
<td>• Harvesting – one significant investment in machine efficiency by 2018.</td>
<td>• Reliable production and market share statistics available to the industry by 2015.</td>
</tr>
<tr>
<td>• Export market scoping complete by 2017.</td>
<td>• Investments contribute to forecast market growth in pasture renewal and demand for temperate pasture legumes. Domestic sales increase from $30M in 2013 to $35M in 2018 and exports increase from $80M in 2013 to $90 million by 2018.</td>
<td><strong>Impact and Consequences</strong></td>
<td><strong>Impact and Consequences</strong></td>
</tr>
<tr>
<td>• Data on benefits of temperate pasture legumes as part of the livestock feedbase.</td>
<td><strong>Impact and Consequences</strong></td>
<td>• Pasture seed production will be viewed by current and new growers as more profitable with fewer production risks, especially with increased demand for planting seed from an increase in pasture renewal rates.</td>
<td>• Research outputs are effectively communicated to industry stakeholders for the purpose of industry and RIRDC utilising data to invest in an informed, targeted and outcome driven manner.</td>
</tr>
<tr>
<td>• Data on benefit of temperate legumes to partner industry by 2016.</td>
<td>• Industry has research and leadership capacity to secure its future.</td>
<td><strong>Impact and Consequences</strong></td>
<td>• A competencies and capabilities report is available by 2016.</td>
</tr>
<tr>
<td>• Data on the benefits of certified seeds by 2016.</td>
<td><strong>Impact and Consequences</strong></td>
<td>• Pasture seed production will be viewed by current and new growers as more profitable with fewer production risks, especially with increased demand for planting seed from an increase in pasture renewal rates.</td>
<td><strong>Impact and Consequences</strong></td>
</tr>
</tbody>
</table>

- **Assessment:**
  - **Data on benefit of temperate legumes to partner industry by 2016:**
    - By 2018 there is a 10% increase in participation in SITAG training courses.
    - International researchers are contributing to the pasture seed program.
  - **Biosecurity plan prepared with stakeholders by 2017:**
    - Three global best practice guidelines prepared and distributed by 2018.
  - **Pasture seed production will be viewed by current and new growers as more profitable with fewer production risks:**
    - Especially with increased demand for planting seed from an increase in pasture renewal rates.
  - **Research outputs are effectively communicated to industry stakeholders for the purpose of industry and RIRDC utilising data to invest in an informed, targeted and outcome driven manner:**
    - A competencies and capabilities report is available by 2016.
    - Cost effective and partner aligned communication is achieved by 2017.
    - A communication strategy is produced with the industry by 2018.
    - Reliable production and market share statistics available to the industry by 2015.
Pasture Seeds Program
Five Year Plan 2013-18
SGA Solutions Pty Ltd and AgEconPlus Pty Ltd
Pub. No. 14/053

Phone: 02 6271 4100
Fax: 02 6271 4199
Bookshop: 1300 634 313
Email: rirdc@rirdc.gov.au
Postal Address: PO Box 4776, Kingston ACT 2604
Street Address: Level 2, 15 National Circuit, Barton ACT 2600

www.rirdc.gov.au