Priorities for new ley legumes for the tropical and subtropical Grains Industries

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Abstract

The Grains Research and Development Corporation is concerned with progressive decline in soil fertility in northern Australian cropping lands and supports research on developing ley legumes as a means of addressing this problem.

This paper details a range of activities, related to R&D on ley legumes, proposed by linkage committees from the cropping sector. Currently funded research in this area is also outlined.

Introduction

The importance of legumes in northern cropping areas is increasing as producers become more concerned about declining paddock fertility in terms of both available nitrogen and soil structural degradation.

The GRDC (Grains Research and Development Corporation) northern panel has developed linkages with 8 regional advisory committees to listen to research priorities developed from farming communities. It is interesting to note that all list better and new ley legumes as a priority. Their description of the overall farming system issue is summarised as follows:

“Farming in sub-tropical and tropical Australia is characterised by high levels of climatic risk and great uncertainty about the profitability of both individual crops and of enterprises based on dryland cropping. Rainfall can occur at any time of the year, so farmers must adopt highly flexible strategies involving their cropping practices, choice of crops, use of inputs, etc. to enable them to take full advantage of favourable opportunities as they occur. Farmers with irrigation are only partially insulated from these effects. Superimposed on this highly variable and complex short term situation, there are worrying long term trends. Indicators such as declining soil organic matter levels, declining grain protein contents, and increasing soil erosion are providing compelling evidence that many of the farming systems currently practised are not sustainable.”

GRDC is addressing legume priorities within 3 major “farming systems” projects and by: (a) directly funding a new northern lucerne breeding/development project; (b) progressing new winter and summer ley legumes towards commercialisation; and (c) supporting the development of a perennial lablab (Lablab purpureus) for the western areas and central Queensland. We are hopeful the farming community will continue to provide advice on current issues and participate in current projects. The northern panel of the GRDC will have to make adjustments to its budget as new issues are proposed.

Ley legume priorities

A number of tasks relating to ley legumes have been put forward by linkage committees. These tasks have become GRDC priorities. They are well researched, driven from paddock level and written by those who contribute to the R&D levy. They are a mixture of current and emerging needs within farming system areas.

There is a need to examine a range of new cropping systems (involving alternative crops and pastures) with the objective of reducing paddock workings and redressing the increase in dryland salinity. This area of work will also involve the development of better stubble handling and spraying equipment. While dryland salinity must be dealt with, research examining salt-tolerant crops should be expanded.
Having assessed legumes and crops as suitable for the region, plant improvement studies should be initiated to obtain better levels of frost, disease (particularly for legume crops) and insect tolerance combined with adequate levels of quality for specific markets. This could involve developing varieties for specific purposes (e.g. human or stockfeed use).

The extent of contribution to soil N fertility of a range of legume forages needs to be assessed, with emphasis on the effects of water stress, stocking rates, varietal differences and soil factors on N accumulation and partitioning.

Large-scale on-farm trials are needed, in order to demonstrate a set of best practice treatments for both forage and crop legumes. In addition, these experiments could be used to advocate the beneficial effects of these plants on sustainability. More experimental work should be carried out on farm properties in joint R&D operations. This should improve the two-way flow of information concerning the need for research and extension, and should involve better integration of animal and crop components of the system, leading to improved sustainability. In discussion with producers, it comes through time and time again that they want more involvement in determining research direction, particularly research that has a focus at paddock level. It is best summarised in the following priority:

“The development of more experimental work on farm properties in joint R&D operations which should improve the two-way flow of information concerning research/extension needs; this will involve better integration of animal and crop components of the system leading to improved sustainability.”

There is a need to investigate the feasibility of breeding lucerne cultivars for use in 3–4 year leys in central Queensland, with emphasis on productivity and N fixation in stress-prone climates, and tolerance to diseases and grazing pressure. Large-scale on-farm trials, in collaborative partnerships between researchers and farmers, will be required to confirm and extend the results on lucerne and medic leys from the DPI “Warra” experiment (Dalal et al. 1995) to commercial conditions in other environments.

A wider range of adapted forage legumes is needed for use in short-term (2–4 year) leys on different soils. This need is particularly acute in central Queensland, where only lablab (Lablab purpureus) and, to a limited extent, lucerne are available for use in leys. The range of legume forages available to farmers is particularly limited in this region; without a wider choice of reliable forage legumes our increasing reliance on fertilisers will not be reversed. A further objective is to accelerate the search for a solution to the bloat problem with lucerne. Once suitable legumes are available for central Queensland, there will be a requirement to work in partnership with farmers to develop and vigorously promote legume-ley farming systems which are more profitable and sustainable.

There is a need to develop a collaborative technology transfer program with strong farmer involvement to convince other farmers and their financial backers of the beneficial effects of lucerne and medic leys on the long-term profitability and sustainability of farms in the southeast Queensland, Darling Downs, and western Downs regions.

**What is being funded?**

- Two integrated “farming system” projects have been initiated for the western area (DAN 266-Miles to Dubbo West) and central Queensland. Both projects have allocated tasks to 3 activity levels: process research; on-farm adaptive research; and problem solving, decision support/extension. A third project for eastern high rainfall areas is being negotiated in 1996–97. Total investment will be in excess of $1.5 M/annum (or more than 15% of the northern budget). It is important for the Australian Tropical Forages Genetic Resource Centre to be aware of and involved in these projects because they are a means to commercialise the Centre’s results. Two major goals of these projects are the development of on-farm and off-farm (catchment) sustainability indicators and involvement/participation of producers in deciding the topics, design and execution of work. It is envisaged that; core sites would be used to trial new species; on-farm management trials should be planned with participating producer groups; and extended information should be packaged for wider use through the participative extension program, TopCrop.
- A project (CSC21) will advance promising winter and summer ley legumes towards commercialisation and continue to evaluate
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new and superior germplasm. There will be on-farm evaluation trials in the south-west, Darling Downs and central Queensland. Herbicide trials will be carried out from Emerald to evaluate herbicide efficacy and legume tolerance to 5 herbicides applied at different rates and times. Herbicide and mechanical methods of ley legume termination will be evaluated.

- A small project, involving CSIRO Tropical Agriculture, will progress the development of a perennial lablab for the western Downs and central Queensland from 1996. This is an important stepping stone to further legume alternatives in the region. Lablab could be the ‘best bet’ to complement opportunity cropping, and it may warrant increased funding to hasten progress.
- A major project on breeding and development of dryland lucerne will commence in 1996–97. An integrated team from NSW Agriculture, QDPI and the Co-operative Research Centre for Tropical Plant Pathology has been commissioned to develop improved lucerne varieties and promote their adoption for the northern region (at this time excluding central Queensland, until a desk-top study has been completed).

GRDC is now focused on funding approximately $750,000 per annum on lucerne breeding, developing winter- and summer-growing ley legumes, perennial lablab and supporting on-farm evaluation and development, and extension of best management practices.

Outcomes from the workshop

I am interested in whether the ATFGRC considers expenditure by the GRDC, as indicated in this paper, is in the best direction for the dollars available. In addition, is there a perception that there are good links with other R&D corporations in provision of complementary funding? Other priorities which might be recommended by this workshop would be considered by the GRDC.

References

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