

Current and recent broad acre sandy soils projects in the South Australian Mallee

Developed by Mallee Sustainable Farming through
“Production and Environment Partnerships”, an Ag
Excellence project funded by the Grains Research &
Development Corporation



Government of
South Australia



Natural Resources
SA Murray-Darling Basin

GRDC
**Grains
Research &
Development
Corporation**

Your GRDC working with you

Contents

Executive Summary	4
Agricultural Agronomy of Sandy Soils	5
Adopting Profitable Crop Sequences in the South Australian Mallee.....	6
Barley National Variety Trials (NVT).....	7
Common vetch as a break crop for marginal cropping systems	8
Coomandook Agricultural Bureau Compendium of previous agricultural works	9
Crown rot resistance in durum	10
Demonstrating best management for Rhizoctonia on the upper EP and the Mallee	11
Demonstrating the benefits of break crops in Northern Mallee no-till cropping systems	13
Developing annual medics tolerant to residues of sulfonylurea herbicides	14
Development of a strand medic cultivar with resistance to powdery mildew	15
Establishment and root morphology of eight diverse Lucerne populations in a low rainfall environment.....	16
Evaluating the agronomic and financial benefits of P-efficient cereal varieties	17
Expediting biological control for snails in cropping areas of the Murray Plains	19
Field evaluation and development of advanced strand medic lines	20
Fodder Factory.....	21
Fungicide control of Rhizoctonia	22
Growing durum demand in SA: gross margin sensitivity analysis trials	23
Improved crop establishment through technological innovation	24
Improved drought stress tolerance in barley.....	25
Improved Management of Snails and Slugs	26
In furrow wetter trial	28
Maintaining profitable Mallee farming systems with retained stubble.....	29
Mallee Challenge	30
Managing micronutrient deficiencies in cropping systems of eastern Australia.....	31
Measuring and managing soil water in Australian Agriculture	33
Medic Trace Element and Tillage Response Demonstration (2) Onion Weed Control Demonstration	34
Microbial products trial Coomandook	35
New Horizons - the next revolution in agriculture	36
Polycultural pasture cropping	37
Potential nitrogen supply and mineralisation as predicted by DGT	38
Poultry litter gasification ash as a cost effective cropping fertiliser	39
Practical development of weed patch management for adoption in grains.....	40
Profitable crop sequencing in the low rainfall areas of South Eastern Australia	41
Reassessing the value of phosphorus replacement strategies on fixing soils	45

Regional Cropping Solutions Network - Low Rainfall	46
Susceptibility of annual medics to powdery mildew	47
Sustainable Brome Grass Management	48
Trialling and demonstrating alternative weed control options with Fleurieu farmers	49
Environmental Sandy Soils	50
Antimethanogenic stockfeed via Eremophylla pellets	51
Demonstrating innovative farmer methods for reduced erosion risks, improved phosphate use efficiency and soil carbon accumulation	52
Managing Mallee Seeps	53
Restoration of South Australia's Mallee Region.....	54
Management of Sandy Soils.....	57
Continuous Improvement of Soil Management to support resilient farming systems	58
Coomandook soil improvement trials	59
Innovative and cost-effective solutions to the treatment of soil acidity in the north-western agricultural areas of the SA MDB NRM region.....	60
Point Pass Soil Constraints investigation	61
Production and Environment Partnerships.....	62
Sand Improvement through manure profiling in low rainfall Northern Mallee	63
Soil Type Characterisation and Moisture Probe Installation Project	64
Spading and ploughing trial with organic matter.....	65
Precision Agriculture & Technology in Sandy Soils	66
Application of Controlled Traffic Farming in the low rainfall zone	67
Demonstrating Precision Farming: Multiple Industries, Multiple Benefits	70
Increasing the economic returns of agronomic management using Precision Agriculture.....	71
Increasing the Uptake of Variable Rate in the SA Mallee	72
Investigating the application of unmanned aerial vehicles in agriculture in the SAMDB region	73
iSheep - Data Driving Management.....	74
Mobile spray diary with location based automated weather import	75
Precision Pasture Management.....	76
Smartphone Apps for Smart Farmers v2	77
Social Media in Agriculture.....	78
Training and Demonstration of PA in practice	79

Executive Summary

This publication has been developed through the Grains Research and Development Corporation (the GRDC) project, “Delivering multiple benefit messages – A partnership with NRM”. The objectives of this project include:

- To identify and prioritise issues that are common to both the grains industry and the regional NRM organisations with key stakeholders, including grain growers and their advisers, people from NRM organisations and research, development and extension providers
- To develop partnerships between the grains industry and the regional NRM organisations to examine opportunities to leverage investment and enable the collaborative delivery of communication and extension activities and products
- To deliver well planned communication and extension programs to achieve on-farm practice change that will provide production / economic gains and NRM / environment outcomes

This project involves four pilot region across South Australia and into North Western Victoria and South Western New South Wales.

The compendium of “Current and recent broad acre sandy soils projects in the South Australian Mallee” addresses the three objectives of the project. The compendium provides information concerning past and current project, including key outcomes from each project and who to contact for further information. Researchers, funders, Government, growers and NRM organisation will be able to utilise the compendium to assess gaps in knowledge and identify future research to fulfil these gaps.

The compendium was compiled using a large numbers of authors that are working within the grains industry on projects relating to sandy soils in the South Australian Mallee region. Although this compendium is not a complete list of every project occurring in the region, the developers of the compendium feel that it is a comprehensive account of projects in the region.

We acknowledge and thank the Coorong Taitiara Local Action Planning office, who has previously produced a similar compendium in their region.

The compendium is a compilation of nearly 60 projects either currently underway or recently finished in the region. Authors were asked to report on projects from 2010 to 2015. Many of the projects that have been included in the compendium are currently underway, while some are complete. The information within this compendium has been provided by the proponents and funding bodies, and has not been edited prior to its inclusion. We thank all contributors.

The development of this compendium is one facet of the pilot project that is being coordinated in the Natural Resources South Australian Murray Darling Basin region.

Agricultural Agronomy of Sandy Soils

Adopting Profitable Crop Sequences in the South Australian Mallee

Proponent: Mallee Sustainable Farming Inc

Funded by: South Australian Grain Industry Trust Fund (SAGIT)

Duration: 2015 - 2018

Project Summary:

This project will provide information to help farmers in the low rainfall South Australian Mallee to select appropriate break crops that enhance the productivity and sustainability of their crop sequences to increase the profitability of their farming businesses.

Replicated field trials will be run over 3 growing seasons (2015 - 2017) at two locations, Waikerie and Loxton. At each location there will be two trial types:

1. Best Bet Break Crop comparison trials (2 per year per site): These trials will compare the range of break crops suitable for farmers in the SA Mallee. At each site, trials will be repeated across two contrasting soil types.
2. Break crop management trials (1 per year per site): For selected break crops, trials will be implemented that explore agronomic management techniques of interest to the local growers.

For further details contact MSF
admin@msfp.org.au 03 5024 5835

Barley National Variety Trials (NVT)

Funded by: Grains Research and Development Corporation (GRDC) through the NVT program

Duration: Ongoing (annually)

Project Summary:

The NVT program was established in 2005 by the Grains Research and Development Corporation (GRDC). It is a national program of comparative crop variety testing with standardised trial management, data generation, collection and dissemination. NVT allows for the comparison of different varieties at the same site, with the same management across different seasons.

Key Outcomes:

- Data is generated annually around barley variety performance in the region.
- Long-term site data is generated to show the performance of varieties relative to each other over time.

Report: www.nvtonline.com.au

For further details contact Rob Wheeler
rob.wheeler@sa.gov.au

Common vetch as a break crop for marginal cropping systems

Proponent: South Australian Research and Development Institute (SARDI)

Funded by: SA Grains Industry Trust

Duration: July 2014 – June 2017

Project Summary:

The project's focus is to provide a genuine legume break crop option for cereal and mixed farmers in the western Eyre Peninsula, Upper North and the Murraylands/Mallee areas. SARDI will trial advanced common vetch lines with specific traits suited to these areas to assess their potential for release. In addition, the project will validate the benefits and potential of common vetch and provide farmers with high-yielding alternative vetch varieties that are well adapted to sandy-alkaline soils in low rainfall environments with variety-specific agronomic packages.

For further details contact Stuart Nagel
stuart.nagel@sa.gov.au 0407 720 729

Coomandook Agricultural Bureau Compendium of previous agricultural works

Proponent: Coorong Tatiara Local Action Plan

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: February 2015 – October 2015

Project Summary:

This document provides a summary of historical and recent agricultural trial and demonstration work conducted around the greater Coomandook area. The catchment of this report is predominantly the cropping regions of the area from Coonalpyn through to Cooke Plains, North to Moorlands and Geranium, and west to include Field and the Malinong ranges.

This summary was compiled by the Coorong Tatiara Local Action Plan, Felicity Turner and Tanja Morgan in July 2015.

The topic areas covered include:

- Soils
- Land Management and Dryland Salinity
- Precision Agriculture
- Broadacre Agronomy
- Pasture

Report: <http://www.coorong.sa.gov.au/coomandook>

For further details contact Coorong Tatiara LAP
tstrugnell@coorong.sa.gov.au 0427 750 050

Crown rot resistance in durum

Proponent: South Australian Research & Development Association (SARDI)

Funded by: SA Grains Industry Trust (SAGIT)

Duration: July 2014 – June 2017

Project Summary:

To develop well adapted durum lines with resistance to crown rot. Current varieties carry no effective resistance and are vulnerable to severe yield loss in dry springs and/or where inoculum is high following close rotations with susceptible crops. The current project seeks to improve the adaptation of breeding lines developed in a previous GRDC project in which resistance had been transferred both from bread wheat and from wild tetraploid lines.

For further details contact Hugh Wallwork
hugh.wallwork@sa.gov.au 08 8303 9382

Demonstrating best management for Rhizoctonia on the upper EP and the Mallee

Proponent: South Australian Research and Development Institute, Minnipa Ag Centre

Funded by: SA Grains Industry Trust

Duration: July 2012 – June 2014

Project Summary:

Farmer demonstrations of canola, Juncea canola, medic and vetch break crops performed well lowering Rhizoctonia inoculum levels, allowing other weed control options, earlier sowing opportunities and higher yield for the following cereal. Oilseeds proved to be a financial risk compared to medic, with economic modelling indicating canola needs to yield at least 0.45t/ha to provide an equivalent gross margin with higher risk compared to a 'medic pasture (sheep)/wheat' rotation in this environment. Low input vetch performed well compared to medic pasture, with a higher yield and a gross margin improvement of \$100/ha being achieved (M Krause Appendix 1).

Fungicide products used in paddock demonstrations, in second year cereals with high Rhizoctonia disease inoculum levels, have shown variable responses depending on products and application. In farm demonstrations the lower cost products provided a better economic benefit. The fungicide products showed responses in field trials at Minnipa in 2013 similar to other regions with in-furrow fungicides being more effective than seed treatments, despite all treatments still having visual Rhizoctonia patches present in wheat and barley. Economically the yield responses were positive on wheat but not on barley and the lower cost options performed well economically despite not achieving the highest yields.

Demonstrating best management for Rhizoctonia on the upper EP and the Mallee (cont..)

The key findings from the Eyre Peninsula (EP) and Mallee Rhizoctonia grower survey were; that break crops are used as a Rhizoctonia management option, with canola rotation being higher in the Mallee and medics higher on EP; fungicide application has been the highest practice change in the last 2 years and the most frequent change farmers would implement if possible; controlling summer weeds and the green bridge have increased in the last two years; growers know nutrition (P, N and trace elements) are important for Rhizoctonia management, and nitrogen and TE applications have increased in the last 2 years

Report: http://www.sagit.com.au/wp-content/uploads/2015/03/S1201-Cook-Rhizoctonia-EP-Mallee_final_with-appendix1.pdf

For further details contact Amanda Cook
amanda.cook@sa.gov.au 0427 270 154

Demonstrating the benefits of break crops in Northern Mallee no-till cropping systems

Proponent: Mallee Sustainable Farming Inc

Funded by: Mallee Catchment Management Authority

Duration: April 2014 – June 2018

Project Summary:

This project established eight paired paddocks in the Northern Victorian Mallee where farmers compare rotations that include a one or two year non-cereal crop phase to the cereal dominated cropping systems that are currently being implemented. The delivery approach for this project is to work with farmers to implement commercial scale comparisons of farming systems with different crop rotations.

For further details contact MSF
admin@msfp.org.au 03 5024 5835

Developing annual medics tolerant to residues of sulfonylurea herbicides

Funded by: Grains Research and Development Corporation (GRDC)

Duration: 2003 - 2006

Project Summary:

The aim of this project was to test and confirm the ability of Angel strand medic to tolerate sulfonyl urea (SU) residues. Field experiments compared Angel's performance to a range of herbicide application rates and situations to gather enough data to bring the new variety to commercialisation.

Key Outcomes:

- Angel has increased dry matter production and N fixation over SU susceptible varieties in the presence of SU residues
- Angel medic can still be effectively controlled in crop by a range of commonly used herbicides
- Angel performs identically to its parent Herald with respect to leaf and pod characteristics, aphid tolerance, *Pratylenchus neglectus*, boron toxicity and rhizobium group
- Angel is recommended as a pasture legume for low to medium rainfall (275-400mm), alkaline loamy sands to loams (pH>6.5), including high boron soils and where

Report:

<https://www.grdc.com.au/Media-Centre/Ground-Cover-Supplements/Ground-Cover-Issue-62-Pastures-Supplement/A-Herald-Angel-may-be-the-answer-to-growers-prayers>

For further details contact Jake Howie, SARDI
jake.howie@sa.gov.au

Development of a strand medic cultivar with resistance to powdery mildew

Proponent: South Australian Research and Development Institute (SARDI)

Funded by: SA Grains Industry Trust

Duration: July 2013 – June 2016

Project Summary:

Project aims:

1. To complete the field evaluation of an elite cohort of strand medics (outcome of S1310R) which have resistance to powdery mildew; improved agronomic performance (of existing strand medic cultivars); tolerance to SU herbicide residues; aphid resistance and larger seeds.
2. To select and commercialise a cultivar bred and developed for South Australian dryland Mallee farming systems.

More specifically this project will:

- Evaluate and validate the agronomic performance of 6-8 elite strand medic lines which are non-segregating (i.e. stable) for powdery mildew resistance, SU herbicide tolerance, larger seeds and aphid resistance
- Initiate seed bulk-up of most promising line(s) for commercial release
- Perform duty-of-care studies (eg phytoestrogen testing, N₂ fixation competence)
- Conduct appropriate IP protection procedures (eg Plant Breeders Rights)
- Initiate commercialisation (eg produce cultivar Technical Information Document, seek expressions of interest from industry, assess tender applications, arrange contracts etc)

For further details contact Ross Ballard
ross.ballard@sa.gov.au 8303 9388

Establishment and root morphology of eight diverse Lucerne populations in a low rainfall environment

Funded by: SARDI Lucerne breeding program

Duration: 2007

Project Summary:

A field trial was established at Coomandook in 2007 to look at the impact of drought conditions on the establishment and survival of 8 diverse lucerne populations. The establishment and root morphology of each variety was assessed to determine if root morphological traits could be attributed to survival over the first summer.

Key Outcomes:

- Varieties of lucerne with higher root weights and numbers of crown buds showed a good correlation with better establishment
- Plants with a high root weight also have a higher taproot diameter, root surface area and greater number of crown buds, which helps with establishment in a dry environment

Report:

http://www.regional.org.au/au/asa/2008/poster/farming-uncertain-climate/6218_marshallem.htm

For further details contact Allan Humphries, SARDI
alan.humphries@sa.gov.au

Evaluating the agronomic and financial benefits of P-efficient cereal varieties

Proponent: University of Adelaide

Funded by: SA Grains Industry Trust (SAGIT)

Duration: July 2012 – June 2015

Project Summary:

The phosphorus use efficiency (PUE) of wheat and barley varieties (with known PUE differences) is being assessed in field trials with different soil P levels and P rates at Minnipa, Mallala and Swan Reach. The economic P rate will be determined for each variety in each of the cropping environments.

The difference in PUE between varieties has been difficult to observe. Gains in yields through breeding new and improved varieties appears to outweigh any advantage of potentially growing P efficient varieties on P deficient soils. Further economic analysis is required to assess whether high P fertiliser rates required on selected soils are a viable option.

Phosphorus deficiency is still a major limitation to maximising yields on selected soils in SA. Replacement P programs only work if the soil P status has been confirmed to be adequate. The efficiency of applied P is less in moderate to high P buffering soils. Optimal P rates on these soils may not be economically viable and therefore finding efficient barley and wheat varieties is important.

Based on these results, and considering current prices for fertiliser and grain, it would be recommended to achieve maximum yields through sufficient P applications and growing varieties suited for a region, rather than selecting potentially high PUE varieties.

Evaluating the agronomic and financial benefits of P-efficient cereal varieties (cont..)

However, comparisons of PUE percentage of new varieties that are performing well in NVT trials in SA is being investigated through a new SAGIT funded project titled "Reassessing the value of P replacement strategies on fixing soils".

Report: www.sagit.com.au/finalreports

For further details contact Sean Mason
sean.mason@adelaide.edu.au 0422 066 635

Expediting biological control for snails in cropping areas of the Murray Plains

Proponent: Eastern Hills and Murray Plains Catchment Group (EHMPCG)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To trial the biological control of snails in the Murray Plains area using *sarcophaga penicillata* at three release and trial sites in partnership with SARDI. Data Collection on snail population and density pre and post-trial establishment and promotion of the trials and results to farmers and interested parties in the SAMDB Region.

For further details contact EHMPCG
admin@ehmpcg.org.au 08 8531 2077

Field evaluation and development of advanced strand medic lines

Funded by: SA Grains Industry Trust (SAGIT)

Duration: 2010 – 2013, 2013 - 2016

Project Summary:

The aim of this project was to evaluate the agronomic performance of 25 advanced medic lines with various combinations of new traits and initiate seed increase in the most promising lines for future commercial release.

Key Outcomes:

- SARDI identified six new medic lines with excellent agronomic performance
- New lines combine powdery mildew resistance with sulfonylurea herbicide tolerance, aphid resistance and larger seed size
- Larger field scale trials are continuing in a new project in 2013-2016 with the aim to commercialise one new cultivar targeting low rainfall EP and Murray Mallee dune swale soils

Report:

<http://www.sagit.com.au/wp-content/uploads/2014/07/2014-11-19-S1310R-Howie-medic-lines-APPROVED1.pdf>

For further details contact Jake Howie, SARDI
jake.howie@sa.gov.au

Fodder Factory

Proponent: Braden Kramer

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To fund the establishment and trial of an on farm fodder factory for the continuous production of fresh green fodder. This will be a means to maintain livestock carrying capacity and condition of livestock and land through the driest parts of the year.

For further details contact Braden Kramer
kramerbs@bigpond.com 0408 031 724

Fungicide control of Rhizoctonia

Funded by: Grains Research and Development Corporation (GRDC), SA Grains Industry Trust (SAGIT)

Duration: 2010 - 2014

Project Summary:

The aim of the trials was to compare the efficacy of different treatments using liquid fungicides and seed treatments (Uniform®, EverGold® Prime and Vibrance®) to reduce the impact of Rhizoctonia on wheat and barley growth. Treatments included varying the product, rate, placement, timing of application and seeding system (knife point versus coulter disc).

Key Outcomes:

- The largest yield increases were achieved in a knife point system with split liquid fungicide application at seeding. Half of the fungicide was banded at the base of the furrow and half on the surface of the furrow
- In crop applications and seed treatments did not perform as well as expected, most likely due to a lack of follow up rainfall and non-wetting soil properties
- Fungicide treatments alone will not eliminate Rhizoctonia patches and need to be used as part of an integrated management program

Report:

<https://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2014/02/Rhizoctonia-control-improved-by-liquid-banding-of-fungicides>

<http://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2014/08/Rhizoctonia-control-improved-by-liquid-banding-of-fungicides>

For further details contact Alan McKay, SARDI
alan.mckay@sa.gov.au

Growing durum demand in SA: gross margin sensitivity analysis trials

Proponent: University of Adelaide

Funded by: SA Grains Industry Trust (SAGIT)

Duration: July 2015 – June 2018

Project Summary:

This project will assess the grain yield and quality of six durum varieties, compared with bread wheat varieties at four "non-traditional" durum locations in SA. These are the Lower Eyre Peninsula, Upper North, Murray Plains and the Upper South East. The latest durum varieties, including DBA Aurora, are expected to be better adapted to calcareous soils, heat and cold stresses and crown rot than previous durum varieties.

For further details contact Jason Able
jason.able@adelaide.edu.au 0459 841 586

Improved crop establishment through technological innovation

Proponent: Mallee Sustainable Farming (MSF)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To demonstrate innovative seeding implement guidance systems (such as iTill and Protrakker) in order to improve crop and pasture establishment and groundcover on vulnerable soil types on dryland farms.

For further details contact Stuart Putland
stuart.putland@msfp.org.au 03 5021 9100

Improved drought stress tolerance in barley

Proponent: University of Adelaide

Funded by: SA Grains Industry Trust (SAGIT)

Duration: July 2012 – June 2015

Project Summary:

The project aims to identify the genetics of adaptation of barley for lower rainfall environments. A genetic analysis of drought tolerance of barley lines will be used to select varieties with improved grain yield and yield stability in SA's lower rainfall cropping areas. This includes genetic analysis of 3700 fixed barley lines (derived from Fleet, Commander and WI4304) in field trials at Minnipa, Roseworthy and Swan Hill.

For further details contact Jason Eglinton
jason.eglinton@adelaide.edu.au 0429 689 040

Improved Management of Snails and Slugs

Proponent: South Australian Research and Development Institute (SARDI)

Funded by: Grains Research and Development Corporation (GRDC)

Duration: July 2013 – June 2016

Project Summary:

Several exotic snail and slug species of European-Mediterranean origin have established in Australia and become significant pests of grain crops. Snails cause significant economic losses through yield loss from feeding damage, field control costs, additional harvest costs, grain value loss and receival rejection, and can threaten market access. Slugs cause significant losses from feeding damage especially at crop establishment, and from costs of re-sowing and field control. Four snail and three slug species are considered the dominant pest species in Australia: *Cernuella virgata*, *Prietocella barbara*, *Cochlicella acuta* (Hygromiidae), *Theba pisana* (Helicidae), *Deroceras reticulatum*, *D. invadens* (Agriolimacidae) and *Milax gagates* (Milacidae). The distributions of these pest species in southern Australia are not well defined, and are unlikely to have yet reached the ecological limits for each species. In this project surveys will be conducted, which complement those initiated in previous GRDC projects, to examine the distributions of these pest species using current geo-referenced data and historical distribution data. The potential geographic extent of each species will be modelled and likely environmental management factors that determine suitable habitat, hence likely pest outbreaks, will be identified. This information will assist with market access, regional management and on-farm hygiene planning.

The objective of this project is to improve the industry's capacity to effectively control snail and slug infestations and manage rapid outbreaks. This will be achieved by a comprehensive research and extension program, integrating with other current Grains Research and Development Corporation investments.

The Research component will focus on four key areas. Firstly, to optimize the liming of bait and other chemical treatments, we will quantify the rainfall/moisture (amount, duration)/temperatures required to stimulate effective breeding and recruitment. Secondly, to improve baiting efficacy and

Improved Management of Snails and Slugs (cont..)

resultant crop protection, we will compare the performance of a range of proprietary bait products and rates (pellet density) on different pest species, age classes (including juveniles) and infestation densities to deliver targeted bait recommendations to growers specifically for the main pest species. Field persistence of baits under the influence of UV and moisture, and the effect of targeted spatial placement of baits, phagostimulants and bait mixtures on bait efficacy will be determined. Thirdly, based on a meta-review of the published literature on other molluscicides, we will select and trial a number of candidate molluscicides against the major pest species. Fourthly, we will survey growers to determine current harvest practices used to limit snail contamination of grain and summer cultural control practices, and use these findings to identify new potential engineering solutions. Also, preliminary research suggests that the mucus of *T. pisana* may contain a substance inhibitory to other snails: hence we will initiate a 'blue sky' pilot study of this 'toxin', and if identified, will investigate its potential as a biological or chemical control.

The Extension component will integrate the new research outcomes with the existing chemical and cultural management guidelines to produce a decision tool aimed at informing management choices for cost-effective snail and slug control. The decision tool will include selection guides for chemical treatment options (based on product cost (per unit area), efficacy, special conditions/limitations and off-target impact, environmental fate) and cultural management options (based on factors such as temperature requirements, soil type, fire-risk factors. etc), and which takes account of region, pest species, etc. If feasible, an alert service (e.g. to optimize bait timing) may be included. This package of newly-developed pest biology and management information will be promoted through comprehensive, regionally focused fact-sheets and at annual workshops in the high mollusc-risk areas of all regions.

For further details contact Michael Nash
michael.nash@sa.gov.au 0417 992 097

In furrow wetter trial

Funded by: State Natural Resources Management Program 2013-14,
Community Grants for land care, coast care and water care

Duration: 2013

Project Summary:

The in furrow wetter trial was established in a non-wetting soil to compare the effectiveness of three different soil wetter products. The products were applied before and after sowing and at 3 different rates.

Key Outcomes:

- Wetters spread on the surface were variable in results.
- Results were inconclusive in terms of yield benefit and it is questionable whether soil wetters are cost effective in a broad acre situation.

Report:

<https://www.coorong.sa.gov.au/sitedata/unity/resources/files/Page%207%20In%20furrow%20wetter%20trial%20see%20page%20three.pdf>

For further details contact Rebecca Tonkin
rebecca.tonkin@sa.gov.au 08 8539 2125 or 0427 273 891

Maintaining profitable Mallee farming systems with retained stubble

Proponent: Mallee Sustainable Farming Inc

Funded by: Grains Research & Development Association (GRDC)

Duration: 2013 – June 2018

Project Summary:

This project will address the major constraints to maintaining profitable farming systems with stubble retention and deliver improved options to grain growers. The project will focus on break crops, soil carbon, seeder setup, disease, weed management, nutrition, monitoring fallow stubble, inter-row sowing, summer/autumn herbicide applications and moisture & erosion.

Information about the outcomes of this and similar work is available in the MSF 2014 Research Compendiums and 2015 Field Day booklets. Go to msfp.org.au and search "Compendium" or "Field Day Booklet". Two Farmtalk publications have also been produced and are available on the MSF website ("Ten things to consider when planning a break crop" and "Soil Carbon in Mallee farming Systems").

For further details contact MSF
admin@msfp.org.au 03 5024 5835

Mallee Challenge

Proponent: Natural Resources South Australian Murray-Darling Basin

Funded by: National Landcare Program

Duration: July 2014 – June 2015

Project Summary:

Natural Resources South Australian Murray-Darling Basin are currently implementing the 8th Year of the Mallee Challenge Project. The larger paddock scale trials of the Mallee Challenge provide dry land producers with meaningful results that relate directly to their business and wider region

Through farmer consultation the Mallee Challenge identifies 10 on-farm trials such as Sand Hill Amelioration with Winery Waste, Deep Rip Nutrients non-wetting sands, Break Crop Nitrogen Assessment and Wheat Protein Variable rate in mid slope sandy soil. Aimed to investigate the hurdles in the adoption of sustainable farming practices the Mallee Challenge project team provides support to farmers throughout the establishment, monitoring and testing phases. As the Mallee Challenge includes a diverse range of projects it also acts to engage a broad span of agriculturalists, thus providing an opportunity for property owners to work alongside local consultants and NR SAMDB staff. The collaborative approach of the Mallee Challenge acts to highlight the importance of local networks.

For further details contact Eliza Rieger
eliza.rieger@sa.gov.au 0408 416 684

Managing micronutrient deficiencies in cropping systems of eastern Australia

Proponent: South Australian Research and Development Institute (SARDI)

Funded by: Grains Research and Development Corporation (GRDC)

Duration: May 2014 – June 2017

Many of the soils in Australia under agricultural production are very old and infertile. This infertility, if left untreated, can result in widespread and severe nutrient deficiencies, including those caused by poor supply or use of micronutrients. While management packages to treat N and P deficiencies are common and well-entrenched across the continent, strategies for managing micronutrient deficiencies are less well known. There is also increasing concern that micronutrient supplies from the soil may no longer be adequate for current cropping systems which are more productive, more intensive and more reliant on supplies of fertiliser N and P. These concerns are often coming from districts where micronutrient deficiencies have not been thought to be a problem in the past.

While micronutrient management packages for Mn, Zn and Cu deficiency exist, these were developed in farming systems which are now 20-40 years old and when fertilisers were relatively cheap. There is increasing speculation that those packages may not be adequate for contemporary cropping systems, that they may not be cost effective under current economic regimes where fertilisers are substantially dearer or that they may not be appropriate for the new areas of cropping which are quite different to the environments in which they originally developed (typically the higher rainfall cropping regions of SA and WA).

This project is addressing these increasing concerns and speculation in a two pronged approach for five micronutrients (Mn, Zn, Cu, B, Mo) for all cropping regions in Australia except for those in WA. This project will produce clear guidelines for management of micronutrient disorders for the major crops in the southern and northern regions of GRDC based on existing knowledge which has been objectively tested for its relevance to modern cropping systems and modernised for current technologies and economic circumstances where necessary.

Managing micronutrient deficiencies in cropping systems of eastern Australia (cont...)

Field experiments are being commissioned for the 2014-16 seasons to investigate or showcase application or management strategies to major crops in targeted situations. Some of these experiments in the first two seasons will be designed to monitor residual benefits of micronutrient applications in subsequent years. Six to seven field experiments will be conducted each season of the project.

The field work will be used to fill gaps in knowledge of micronutrient management and to confirm those aspects of conventional wisdom which are still relevant to modern cropping systems. These combined sources of information will be used to review and revamp existing fact sheets on micronutrient management into GRDC layout.

Another component of this project will be to construct a database of historical and current micronutrient management research and development in Australia. Formal scientific papers will be published based on the field data.



For further details contact Sjaan Davey
sjaan.davey@sa.gov.au 0467 732 672

Measuring and managing soil water in Australian Agriculture

Funded by: Grains Research and Development Corporation (GRDC)

Project Summary:

This project aims to engage with groups in areas where soil water hasn't previously been a major focus and fill some gaps in both grower and consultant knowledge and gaps in the APSOIL database by increasing the number of soils that are characterised in these areas.

Key Outcomes:

- 10 sites in the Upper SE region have been characterised and are in the process of being included in the APSOIL database.
- Difficult to characterise soils have been identified and links between researchers and growers achieved to work towards a validation process around these soils.
- Growers and consultants across the region have improved their soils knowledge, and knowledge around the APSIM model and potential uses.

For further details contact Mark Thomas
Mark.Thomas@csiro.com.au

Medic Trace Element and Tillage Response Demonstration (2) Onion Weed Control Demonstration

Funded by: National Landcare Programme

Proponent: Natural Resources SA Murray-Darling Basin

Duration: 2013 - 2018

Project Summary:

The Southern and Northern Grazing Management Groups are assessing and investigating two trials (1) Medic Trace Element and Tillage Response Demonstration and (2) Onion Weed Control Demonstration.

1. Medic Trace Element and Tillage Response Demonstration will include the application of the following treatments:
 - Control – no treatment
 - Tillage treatment
 - Zinc treatment @ applications of 0, 2.5kg, 5kg, 7.5kg and 10kg
 - Copper treatment @ applications of 0, 2.5kg, 5kg, 7.5kg and 10kg
2. Onion Weed Control Demonstration treatments will include a selection of herbicides from the best treatments from 2015 trial results. The treatments will be applied to a new site with monitoring continuing on the current site

For further details contact Bernadette Lawson
bernadette.lawson@sa.gov.au 0429 674 428

Microbial products trial Coomandook

Funded by: State Natural Resources Management Program 2013-14, Community Grants for land care, coast care and water care

Duration: 2013

Project Summary:

Two different microbial products were trialed separately to determine their benefits in a wheat crop. A plant growth promoting rhizobacterie (PGBR) as well as a Vehicular Arbuscular Mycorrhizal (VAM) fungi product were trialed at different application rates.

Key Outcomes:

- Results showed no effect of any of the treatments on wheat yield
- A pea crop was grown in the previous year; therefore the soil was likely to have increased fungi, bacteria and N level
- A site low in microbial activity may show a different result

Report:

<http://www.coorong.sa.gov.au/webdata/resources/files/Page%2017%20Microbial%20Products%20Trial%20Coomandook%202013.pdf>

For further details contact Rebecca Tonkin
rebecca.tonkin@sa.gov.au 08 8539 2125 or 0427 273 891

New Horizons - the next revolution in agriculture

Proponent: South Australian Government

Funded by: South Australian Government

Duration: July 2013 – June 2015

Project Summary:

New Horizons is a PIRSA initiative to significantly improve broadacre crop and livestock pasture productivity on South Australia's poorly performing soils.

Approximately 40% (4.1 million hectares) of South Australia's broadacre farming area has soil constraints that could be overcome through the application of new advances in technology, machinery and soil management.

Since the 1860's, Australian dryland farming has focused on getting the most out of our existing top 10 cm of soil. New Horizons is the next revolution in agriculture as it focuses on modifying the soil profile to 50 cm to overcome constraints. The program specifically seeks to address: soil compaction that limits root growth; low fertility or nutrient deficient soils; soils with low water holding capacity.

New Horizons is investigating and demonstrating how improving the fertility and water holding capacity of sandy soils through additions of clay, organic matter and fertiliser incorporated deep into the soil profile will create a more conducive growing environment, thereby increasing productivity. Existing research demonstrates that this can lead to an average 70% improvement in yield on sandy soils. If the proposed production techniques are adopted across the low productive soils of the state, it is estimated it will result in a net increase in agricultural production of \$800 million per annum in South Australia.

One of three trials being conducted across the state is located at Karoonda in the Murray Mallee.

Report: http://pir.sa.gov.au/major_programs/new_horizons

For further details contact Nigel Wilhelm
nigel.wilhelm@sa.gov.au 0407 185 501

Polycultural pasture cropping

Proponent: Tom Bradman

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To design and establish a replicate trial of monocultural and polycultural pasture cropping (10 species mix minimum) as well as varietal and fertiliser trials with control plots.

For further details contact Tom Bradman
woodlandrun@internode.on.net 0412 500 022

Potential nitrogen supply and mineralisation as predicted by DGT

Proponent: University of Adelaide

Funded by: SA Grains Industry Trust

Duration: July 2014 – June 2015

Project Summary:

The project will evaluate a new DGT (diffuse gradient thin film) test for predicting nitrogen requirements for wheat crops based on measuring soil nitrate and ammonium and the mineralisation potential of the soil. This will involve developing a new resin type and comparing results of current soil nitrogen tests with those using the DGT system across a range of soil types in South Australia.

Report: www.sagit.com.au/finalreports

For further details contact Sean Mason
sean.mason@adelaide.edu.au 0422 066 635

Poultry litter gasification ash as a cost effective cropping fertiliser

Proponent: South Australian No-Till Farmers Association Inc. (SANTFA)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To fund the testing of the ash left over from the conversion of chicken litter to energy as a cost effective source of nutrient fertiliser for cropping farmers. This will be undertaken through a field trial at Karoonda and will include a field day(s) to disseminate the results of the trial to farmers and other interested parties.

For further details contact Greg Butler
greg@santfa.com.au 0427 424 278

Practical development of weed patch management for adoption in grains

Proponent: South Australian Research and Development Institute (SARDI)

Funded by: SA Grains Industry Trust

Duration: July 2012 – November 2015

An increasing number of SA growers now have GPS guidance and boom sprayer section control that is suitable for site specific weed management. Despite these technical advances in SSWM most growers are still hesitant to experiment because the economic benefits have not been adequately assessed.

This project aimed to determine paddock zones to which weed control expenditure is best targeted. It also compiled a User's Guide for growers and advisors who wish to explore SSWM. Paddocks with suitable infestations of ryegrass and brome grass were chosen for experiments to measure the economic benefit from controlling grass weeds in different yield potential zones. There was little evidence that the original hypothesis of returns being greater from grassy weed control in zones of the paddock where grassy weed populations were moderate (and yield potential high) because of the critical need to control recruitment in grassy weeds to prevent major blow outs in weed problems in subsequent years. Zone management is best regarded as an opportunity to hold off on expensive but highly effective herbicides in areas of paddocks where weed populations are currently very low rather than seeing it as an opportunity of only using the expensive but highly effective herbicides on dense weed patches.

For further details contact Nigel Wilhelm
nigel.wilhelm@sa.gov.au 0407 185 501

Profitable crop sequencing in the low rainfall areas of South Eastern Australia

Proponent: South Australian Research & Development Association (SARDI)

Funded by: Grains Research & Development Association (GRDC)

Duration: 2010 – March 2016

Project Summary:

In low rainfall regions of south-eastern Australia, farmers have increasingly adopted continuous cereal cropping strategies as non-cereal crops are perceived as riskier than cereals due to greater yield and price fluctuations. There is a need for profitable non-cereal crop and pasture options to provide disease breaks, weed control opportunities and fix nitrogen for future cereal crops.

This project is developing an improved understanding and implementation of management practices for brassica and pulse crops, pastures and other break options that will reduce risk and improve whole farm profitability in the low rainfall zone south-east Australia.

It is a collaborative project between five farming systems groups which already have extensive extension networks as well as R&D capability (Eyre Peninsula, Upper North, Mallee Sustainable Farming, BCG and Central West). Over-arching guidance and support is being provided by SARDI and the Low Rainfall Collaboration project in the early years.

Five small plot experiments are being conducted at locations and environments which are representative for each FS region and are investigating a wide range of break crop and pasture types with management options which give them the best chance to perform economically. The sites are on long term wheat paddocks with issues/constraints to cereal production that were identified by local farmers and consultants. Central to each experiment are a break phase of 2 years which will be followed by 2 years of cereal. Many break options are also being assessed with alternative end uses (eg grain vs hay, grazing vs green manure).

Profitable crop sequencing in the low rainfall areas of South Eastern Australia (cont...)

The table below shows the locations, issues and site details for each experiment.

Location; Soil type	Paddock history	Emerging problem
Condobolin, NSW; deep red	2 wheat	Wild Oats, Ryegrass
Chinkapook; Vic, sandy loam	At least 4 wheat	Brome grass
Mildura, Vic; deep sand	At least 7 wheat	Brome grass, low soil fert
Appila, SA; red brown earth	3 cereals	Ryegrass, Wild Oats
Minnipa, SA; calc loam	At least 5 wheat	Rye grass, low soil fert, Rhizoct

The first three years of each small plot experiment have now been completed successfully. Each experiment has now fully tested each of the two years of between 13 and 19 break packages and compared their performance against continuous wheat in 2013. Several packages are common to all experiments.

Some messages from these experiments so far:

- While production in continuous wheat varied across the sites from just over 1 t/ha to more than 3 t/ha, wheat preceded by a two year break yielded much better than continuous wheat, by at least 0.5 and to more than 1 t/ha.
- Any break combination which substantially reduced the major constraints to wheat production at that site, resulted in large yields benefits - these constraints were mostly grassy weeds but rhizoctonia and low N fertility was also factors.
- Initial gross margin comparisons are showing that 2 year breaks can be more profitable over 3 years than continuous wheat, providing at least one of the break years produced a reasonable profit.

Profitable crop sequencing in the low rainfall areas of South Eastern Australia (cont...)

- One year breaks resulted in improved wheat production in the following two years of wheat but grassy weed levels built again quickly.
- Continuous wheat is becoming increasingly expensive to manage as low N fertility and building grass pressure demand higher inputs.
- Chemical fallow was a very effective break for wheat but decreased all beneficial microbial activities eg N supply potential and high levels of root disease on wheat despite low inoculum levels.
- Pasture phases often had better microbial activity than cropping options
- Non-cereal phases reduced rhizo inoculum and reduced disease in 2013 wheat with canola being the most effective.
- One or two year break crops (in contrast to pastures) have had similar impact on microbial processes to continuous wheat.

Demonstration sites in commercial paddocks which are already addressing a continuous cereal problem with a non-cereal break continue to be monitored in each FS region. These sites have supported findings in the small plot experiments and some have been monitored into the second year of wheat following breaks. They are an important link between the replicated experiments and practice change on farm.

Agronomic outcomes from this project are being examined for their economic and risk impacts.

A guide for improved decision making for the implementation and management of break phases in low rainfall south-eastern Australia will be developed and promoted to the regional communities as part of this project.

The outcome from this project will be more reliable and more productive low rainfall farming systems through the increased use of less risky broad leaved break phases.

Profitable crop sequencing in the low rainfall areas of South Eastern Australia (cont...)

Information about the outcomes of this and similar work is available in the MSF Research Compendiums 2014 "Two year breaks profitably reduce the agronomic constraints in the Northern Victorian Mallee". Go to msfp.org.au and search 'Compendium'.

Report: <http://msfp.org.au/break-crop-adoption-in-the-mallee-2/>



For further details contact Nigel Wilhelm
nigel.wilhelm@sa.gov.au 0407 185 501

Reassessing the value of phosphorus replacement strategies on fixing soils

Proponent: University of Adelaide

Funded by: SA Grains Industry Trust

Duration: July 2015 – June 2017

Project Summary:

This is ongoing work to assess the phosphorus use efficiency of 3-4 wheat and barley varieties at three sites in SA in 2015 and 2016. This is to identify varieties that can produce the same or more grain yield using less phosphorus. This project will also continue the validation of mid-infrared (MIR) instruments for measuring the soil phosphorus buffering index in the field.

For further details contact Sean Mason
sean.mason@adelaide.edu.au 0422 066 635

Regional Cropping Solutions Network - Low Rainfall

Proponent: Grains Research and Development Corporation (GRDC)

Funded by: Grains Research and Development Corporation (GRDC)

Duration: July 2013 – August 2016

The Grains Research and Development Corporation (GRDC) is committed to investing in research, development and extension (RD&E) to benefit Australian grain growers. To assist the GRDC in maintaining strong connections with growers and identify locally specific RD&E priorities, Regional Cropping Solutions Networks (RCSNs) were established in the grain-growing regions of southern Australia in 2012. There are four RCSNs within the GRDC southern region, representing key grain production zones: low rainfall, medium rainfall, high rainfall and irrigation. Each network comprises growers, researchers, representatives of farming systems groups, consultants and other grains industry stakeholders. The networks are led by facilitators and supported by the GRDC's Southern Regional Panel and the GRDC Manager Regional Grower Services. The purpose of the GRDC's Regional Cropping Solutions (RCS) initiative is to provide essential on ground linkages between growers, farming systems groups, agribusiness and researchers complementary to the National Grains Industry R, D & E Strategy to better plan and design local activities of greatest benefit.

The RCSNs meet several times each year to identify the priority issues facing growers in the southern grain growing region and to provide the GRDC with detailed information about the issues. This information helps the GRDC to plan and determine its annual RD&E investments to achieve maximum effectiveness of RD&E levies at a local, regional and national scale.

Report: <http://www.grdc.com.au/About-Us/Our-Grains-Industry/Regional-Cropping-Solutions-Networks#sthash.MgjfnY4z.dpuf>

For further details contact Nigel Wilhelm
nigel.wilhelm@sa.gov.au 0407 185 501

Susceptibility of annual medics to powdery mildew

Funded by: Grains Research and Development Corporation (GRDC), SA Grains Industry Trust (SAGIT)

Duration: 2011

Project Summary:

Fourteen annual medics, including powdery mildew (PM) resistant strand medic lines, were grown at two field sites in South Australia. At the Netherton site a natural infection of PM developed rapidly in October, giving excellent testing conditions.

Key Outcomes:

- The PM2 (PM resistant strand medic) and all of the PM –strand lines (low PM susceptibility) displayed less leaf senescence than the susceptible cultivars, Caliph, Angel, Herald, Toreador, Tornafield and to a lesser extent, Scimitar
- PM2 and PM-strand lines out yielded susceptible cultivars Herald and Angel with respect to seed yield by at least 24%
- The PM-strand lines are also tolerant of SU herbicide residues and blue green aphids
- Future work will involve developing these lines in to a cultivar

Report:

http://www.regional.org.au/au/asa/2012/pests/8226_ballard.htm

<http://msfp.org.au/wp-content/uploads/2013/06/2012-Powdery-mildew-resistant-medics-for-the-Mallee-and-Eyre-Peninsula-Pastures.pdf>

For further details contact Jake Howie, SARDI
jake.howie@sa.gov.au Ross Ballard, SARDI
ross.ballard@sa.gov.au

Sustainable Brome Grass Management

Proponent: Mallee Sustainable Farming Inc

Funded by: Mallee Catchment Management Authority

Duration: April 2014 – June 2018

Project Summary:

This project established four paired paddocks in a commercial setting where farmers compare an Integrated Weed Management (IWM) strategy to current brome grass management practices in cereal based no-till cropping systems.

The video "Getting Brome on the Back Foot" is available on the MSFMildura Youtube channel .Information about the outcomes of this and similar work is available in the MSF 2015 Research Compendiums and 2014 Karoonda Field Day booklets. Go to msfp.org.au and search "Compendium" or "Field Day Booklet".

Report: <https://www.youtube.com/watch?v=EXTNGHGWfKE>

For further details contact MSF
admin@msfp.org.au 03 5024 5835

Trialling and demonstrating alternative weed control options with Fleurieu farmers

Proponent: Goolwa to Wellington Local Action Planning Association Inc. (GWLAP)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To demonstrate alternative non-chemical control options for agricultural and environmental weeds for viticultural and farming industries for a known and growing number of the community who are keen to reduce chemical use in farm operations.

For further details contact GWLAP
ben.simon@gwlap.org.au 08 8536 5620

Environmental Sandy Soils

Antimethanogenic stockfeed via Eremophylla pellets

Proponent: SA No-Till Farmers Association (SANTFA)

Funded by: Department of Agriculture, Fisheries & Forestry

Duration: June 2012 – June 2015

This project will trial and demonstrate the on-farm production and harvesting Eremophylla, its processing and manufacture as either a hay feed or a feed pellet for use as a feed supplement for intensively farmed cattle to reduce methane emission. On-farm production will be trialled at three properties in South Australia with the effectiveness of Eremophylla in reducing livestock emissions when used as pelletised feed supplement evaluation at Gatton University, Queensland.

For further details contact Greg Butler
greg@santfa.com.au 0427 424 278

Demonstrating innovative farmer methods for reduced erosion risks, improved phosphate use efficiency and soil carbon accumulation

Proponent: SA No-Till Farmers Association (SANTFA)

Funded by: Department of Agriculture

Duration: March 2014 – March 2016

This project will promote a variety of innovative practices in conjunction with leading farmers that are willing to share cutting edge concepts with the wider farming community. The demonstrations will highlight the mechanisms and benefits of practices that have achieved a proof of concept and could be widely adopted to increase permanent soil cover during traditional fallow periods, increase crop canopy cover following seeding, increase crop canopy weed competition, improve phosphate-use-efficiency and increase soil carbon accumulation.

For further details contact Greg Butler
greg@santfa.com.au 0427 424 278

Managing Mallee Seeps

Funded by: National Landcare Programme

Proponent: Natural Resources SA Murray-Darling Basin

Duration: 2009 - 2018

Project Summary:

Farmers of the SA Murray Darling Basin are taking the lead and establishing on-farm trials to investigate and assess agronomic and environmental issues which are effecting farm sustainability. Farmers working with farmers has led to changes in management practice, as the benefits from small plots are extended to paddock-scale and across farms.

Attracting the most attention and interest are the trials set up to investigate and assess Mallee dune seeps – a paradox in low rainfall cropping areas. The number of reports from farmers affected by dune seeps rapidly increasing, as they watch productive land become waterlogged, bare and scalded and finally unproductive. Seeps are not only restricted to the SA Mallee but also appear on Yorke Peninsula and Eyre Peninsula.

Mallee seeps usually start as non-saline wet areas susceptible to waterlogging but able to grow crops. Over time the area becomes saturated, bare and scalded and machinery access is restricted. The only plants known to grow on these scalds are rye grass, brome and thistles.

In partnership with the National Landcare Programme, Mallee farmers, the South Australian Murray Darling Basin Natural Resources Management Board and the Department of Environment, Water and Natural Resources, an investigative and assessment study was commissioned to determine the extent and nature of the problem.

The study includes an assessment of the landscape and soil analysis at four representative sites and the establishment of trial sites to determine suitable agronomic and environmental options to manage the problem. The aim of the trials is to assist farmers, land management advisors and agronomists to understand the processes and provide information on options to manage the problem.

Managing Mallee Seeps (cont...)

Options currently under trial include:

- Planting of perennial high water use plants. The planting of deep rooted lucerne to increase water use.
- Planting of deep rooted shrubs and trees. Strategic planting to intercept mid slope moisture to dry up seeps down slope.
- Perennial salt tolerant shrubs and pastures. Revegetating the edge of the site with tolerant species and moving in as the area becomes drier and less salty.

The options available to farmers to control or contain the spread of Mallee seeps needs to be practical and suited to the farming enterprise, especially with current modern farming machinery and systems. Results from the trials will provide with the right information to enable a considered decision to be made as to the right management options for a farm business while not compromising on conservation farming methods.

The project has been embraced by the farming community with participating farmers contributing resources and time to establish the trials and assist in the collection and collation of data and information.

For further details contact Bernadette Lawson
bernadette.lawson@sa.gov.au 0429 674 428

Proponent: SA No-Till Farmers Association (SANTFA)

Funded by: Department of Sustainability, Environment, Water, Population and Communities

Duration: June 2012 – June 2017

The SA No-Till Farmers Association comprises over 720 landholders managing over 2 million hectares of agricultural land in South Australia. Several SANTFA members are interested in biodiversity decline within the Mallee agricultural region in SA through direct on farm restoration of land classes. This systematic approach to restoration within a productive base will provide confidence to other landholders when considering diversification of income or other uses on farm. This approach of delivering biodiversity restoration through an established farming NGO is innovative and will lead to greater adoption rates compared to traditional delivery models. This project aims to revegetate 1,000ha and restore 500ha.

Through the direct engagement of SANTFA members, this project will provide outcomes across the Mallee region of South Australia. This region incorporates the South Australian Government's Nature Link Corridor (River Murray) and utilises existing State Government Landscape Assessment Framework to guide biodiversity conservation in this region. Direct and measurable outcomes by delivering through SANTFA include:

1. Increasing ecological resilience by establishing 1,000ha of biodiversity plantings and restoring 500ha of remnant vegetation within fragmented Mallee agricultural landscapes.
2. Facilitating ecological function within the landscape by connecting remnant native vegetation and demonstrating the role of ecological systems to farming operations (ecological services).
3. Increasing carbon stores through the establishment of native vegetation with a depleted landscape. Expected carbon outcome could be in the order of 150,000 CO₂-e t/ha/yr over 100 years.

Restoration of South Australia's Mallee Region (cont...)

4. Building capacity by providing a trusted and established landholder-based NGO as a contact point for farmers to approach for restoration activities knowing that financial productivity of their businesses will be accounted for. This approach will increase partnerships and the extent of native habitats within fragmented landscapes.
5. Removing barriers to large scale revegetation by embedding restoration activities within farm business planning and management and providing incentives to maintain through the carbon market
6. Removing barriers to large scale revegetation by a coordinated approach to action on the ground by strong governance through the SANTFA board of management and the establishment of a Clean Energy Initiative Project Board.
7. Measurement of the expected biodiversity outcome through the established NRM Bush Monitoring Condition Assessment Framework.

For further details contact Greg Butler
greg@santfa.com.au 0427 424 278

Management of Sandy Soils

Continuous Improvement of Soil Management to support resilient farming systems

Funded by: Australian Government (DAFF) through the Caring for Our Country Program

Duration: 2009 - 2013

Project Summary:

The project aimed to assist land managers throughout the SE NRM region to build healthier, more robust soils by innovative management of soil constraints, leading to the adoption of more sustainable farm management practices. The activities at each location across the region were determined through consultation with landholders.

Key Outcomes:

- Six soil pits were dug and data sheets established for these sites
- Workshops were held to disseminate the information to the local community and to discuss management options for each of the soils

Report:

<https://www.coorong.sa.gov.au/sitedata/unity/resources/files/Soil%20profile%20descriptions%20from%20the%20greater%20Coomandook%20Region.pdf>

For further details contact Mel Fraser, Rural Solutions Struan Melissa.fraser@sa.gov.au

Coomandook soil improvement trials

Proponent: Coomandook Agricultural Bureau

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: 2013 –2016

This three year trial was established to investigate the potential of range of treatments to overcome the problem of non-wetting sand without using clay. There are thirty treatments each replicated four times including: Control, Moldboard Plough and Spader as the soil treatments; and these are combined with different organic matter and fertiliser treatments: Aged Pig Manure, Composted Pig Manure, Composted Grape Marc, Vetch Hay, Cereal Straw, Cereal Silage, Fertiliser 1 (135 kg DAP in 3 applications), Fert 2 (270 kg DAP in 3 applications), Fert 3 (67 kg DAP in 3 applications) and the Control (nil).

After year two, clear differences can be seen between the control treatments and the treatments with soil modification. The plots with manure, grape marc or vetch hay are showing strong growth, and plots with fertiliser are also growing better than the control. The cereal straw plots are showing signs of N deficiency.

A harvest report of trial results has been developed for year one and two of the trial, with a more comprehensive final report of the three year results to be completed in March 2016.

You can find these stories on the MSF website. Go to www.msfp.org.au and type “GRDC NRM Partnership” into the search box.

For further details contact Tony Randall
tony.randall2@sa.gov.au 0427 834 396 or Rebecca
Tonkin rebecca.tonkin@sa.gov.au 0427 273 891

Innovative and cost-effective solutions to the treatment of soil acidity in the north-western agricultural areas of the SA MDB NRM region.

Proponent: Agricultural Bureau of SA

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

Innovative and cost-effective solutions to the treatment of soil acidity in the north-western agricultural areas of the SAMDB region. To demonstrate and promote the on-the-go soil pH machine. It will measure and map the spatial variability of soil pH across paddocks and use the zoned maps to apply targeted variable rates of lime. The project will engage 20 properties to assess the extent of surface and subsurface soil acidity across the target area and will conduct a field day to showcase latest technologies and monitoring results.

For further details contact Mark Grossman
Koonawarrasheep@bigpond.com 0408 085 682

Point Pass Soil Constraints investigation

Proponent: Agricultural Bureau of SA (on behalf of Point Pass Agricultural Bureau)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To investigate the soil constraints that limit productivity and sustainability within the area of the Point Pass Agricultural Bureau. Constraints include soil sodicity and heavy textured clay layers affecting plant root growth and water infiltration, the limiting nutritional effects of salinity and boron within the lower root zone, acidity on the slopes and alkalinity on the flats. The project will build on the recent soils field day held in 2013.

For further details contact Point Pass Ag Bureau
koonawarrasheep@bigpond.com 08 8565 3232

Production and Environment Partnerships

Proponent: Ag Excellence Alliance Inc.

Funded by: Grains Research & Development Association (GRDC)

Duration: April 2014 – December 2016

Project Summary:

Ag Excellence Alliance is leading an innovative project to bring together grains industry and natural resources management (NRM) people to work together in extending sustainable farm practices on key production issues that have clear environmental outcomes. The project is working with seven NRM/CMA/LLS regions and five farming systems groups across South Australia, Victoria and NSW to identify their production issues, and then to develop and deliver an extension and communications program to address the issues.

Mallee Region

Activities in the Mallee include:

- Sharing Yield Prophet updates via the MSF Facebook page
- Promotion of articles in "The Drift" the weekly e-newsletter produced by Natural Resources SAMDB. Stories can be accessed on the MSF website
- Production of a compendium of broad acre sandy soils projects, aiming to provide the SAMDB agricultural and environmental communities with an up to date source of current and recent past project that have or are being undertaken in the region, detailing where to find additional information on the project and its findings

For further details contact Mark Stanley
mark@regionalconnections.com.au 0427 831 151

Sand Improvement through manure profiling in low rainfall Northern Mallee

Proponent: Lowbank Ag Bureau

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To improve the production and protection of poorly performing sands in the Waikerie District and across the Northern Mallee through the profiling of chicken manure that has become readily available in the area due to recent and large scale chicken farm developments.

For further details contact Brenton Kroehn
bkroehn@hotmail.com 0427 414 494

Soil Type Characterisation and Moisture Probe Installation Project

Proponent: Coomandook Ag Bureau

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: February 2015 – June 2015

Project Summary:

The project improved the Bureau's knowledge of the constraints and barriers to primary production linked directly to the regions shallow stony soil types. A weather station and four moisture probes were installed in the region providing publicly available climate and soil data to the group. The information they provide is publically available through Natural Resources SAMDB website with the Coomandook weather station (Roby) available through Natural Resources SE website.

Key Outcomes:

Four predomination soil types in the region were selected to help gain a better understanding of their production potential. At each site, soil moisture probes were installed, soil profile classification and characterisation were conducted, including assessment of chemical and physical properties and constraints at each site. Field Days with soil pits were held at each site. Report prepared identifying the current primary production aspects of each soil, any constraints or limitations to production, management options for each site and future research opportunities.

You can find these stories on the MSF website. Go to www.msfp.org.au and type “GRDC NRM Partnership” into the search box.

For further details contact Brad Williams
williamsbradoo7@gmail.com 0401 864 177

Spading and ploughing trial with organic matter

Funded by: State Natural Resources Management Program 2013-14, Community Grants for land care, coast care and water care

Duration: 2013 - 2014

Project Summary:

This trial aimed to compare the effectiveness of different soil modification treatments in overcoming water repellence on sandy soil and improving soil fertility. Treatments were applied in 2013 and included Mouldboard ploughing and spading. Nutrition treatments included applying pig manure, cereal straw, silage and vetch hay, composted grape marc and high analysis fertiliser.

Key Outcomes:

- The cost of spading took 2 years to recover.
- Mouldboard ploughing costs less to implement but the yield benefits are smaller.
- The profitability of compost, manure or plant matter depends on the cost of the product; the cheapest closest source of nutrition is the most profitable.
- Adding organic matter with no soil modification has not shown an increase in profit.

Report:

<http://www.coorong.sa.gov.au/sitedata/unity/resources/files/Page%204%20Spading%20and%20ploughing%20trial%20with%20organic%20matter%202013.pdf>

<http://www.coorong.sa.gov.au/sitedata/unity/resources/files/Page%204%20Spading%20and%20ploughing%20trial%20with%20organic%20matter%202014-1.pdf>

For further details contact Rebecca Tonkin
rebecca.tonkin@sa.gov.au 08 8539 2125 or 0427 273 891

Precision Agriculture & Technology in Sandy Soils

Application of Controlled Traffic Farming in the low rainfall zone

Proponent: Australian Controlled Traffic Farming Association

Funded by: Grains Research & Development Association (GRDC)

Duration: July 2014 – 2019

Project Summary:

Adoption of Controlled Traffic Farming (CTF) in the low rainfall zone (LRZ) of the Southern Region is very low (eg SA/Vic Mallee, 4%) compared to other zones in the Region (eg Vic HR, 26%). This is believed to reflect scepticism about its benefits in many LRZ environments when weighed up against the cost of adopting the practice.

This project is evaluating whether or not this scepticism is justified. It is using a combination of research and development (R&D) to answer growers questions about CTF and provide the information they need to make informed decisions about whether to invest in adopting the system on their farms. Based on the results of the R&D, the extension component of the project will deliver knowledge, skills and support to growers to enable them to fully assess the merits of CTF application in their farm business and where applicable, help them adopt CTF in whole or in part.

The work of the project will be conducted by a consortium of nine organisations led by the national peak body for controlled traffic, the Australian Controlled Traffic Farming Association (ACTFA). The consortium brings together knowledge and experience of CTF systems from ACTFA and Precision Agriculture Australia (SPAA); strong research capability from South Australian Research and Development Institute (SARDI) and Victorian Department of Environment and Primary Industries (DEPI); development and extension knowledge and networks from those two State agencies; and grower participation from five farming systems groups (Birchip Cropping Group, Central West Farming Systems, Eyre Peninsular Agricultural Research Foundation, Mallee Sustainable Farming, and Upper North Farming Systems) that cover the majority of the Southern Region LRZ.

Application of Controlled Traffic Farming in the low rainfall zone (cont...)

A Project Steering Group, chaired by ACTFA and consisting of growers, farming systems group representatives and researchers, will oversee the project to ensure the relevance of project activities and the delivery of the project outputs. An early task was to commission a survey to assess current practices and attitudes towards CTF in the LRZ, which will be repeated at the end of the project to assess any changes.

To help LRZ growers answer the questions and uncertainties they face when thinking about CTF adoption, the project is conducting research on four sites (R sites) across dominant soil types and agro-ecological zones in the Southern Region LRZ. At these sites, information is being gathered on soil properties and crop growth under a range of existing compaction situations to enable comparison of crop productivity between current guidance systems and full CTF. To add more value to the four sites and allow wider application of the results, APSIM modelling will be used to help evaluate crop response to controlled traffic over a wider range of seasonal conditions.

The research data from these sites will be supported by information from 20 Development sites (D sites) that will reflect the priorities of farming systems group members. D sites will more broadly investigate: i) how well soil compaction effects can be reduced by self-repair or amelioration practices, ii) the power and energy benefits from CTF and iii) the system (timeliness and uniformity) benefits of CTF. The D sites will be less intensively monitored than the R sites, but will be supported with instrumentation and measurements by the research team, ensuring integration and consistent work across all R and D sites.

Application of Controlled Traffic Farming in the low rainfall zone (cont...)

The research activity will provide valuable information to help answer the important questions being asked about the relationship of CTF to grain productivity in the LRZ, especially on the characteristically light soils of the region where there is currently little information on soil compaction or its effects, or on the effectiveness of CTF systems. Outputs will include published reports on the results, two scientific papers, appropriate extension materials and a full account of research questions and answers in the project final report.

For further details contact Nigel Wilhelm
nigel.wilhelm@sa.gov.au 0407 185 501

Demonstrating Precision Farming: Multiple Industries, Multiple Benefits

Proponent: Society of Precision Agriculture Australia (SPAA)

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To educate farmers of the environmental benefits in the application of precision agriculture (PA) technologies on farm. To engage with a number of agricultural industries in the SAMDB region through undertaking a minimum of three PA workshops and producing feature articles to be published across the farming systems group network involved in the activities and throughout SPAA traditional communication mediums.

For further details contact Nicole Dimos
nicole@spaa.com.au 0437 422 000

Increasing the economic returns of agronomic management using Precision Agriculture

Funded by: SA Grains Industry Trust (SAGIT)

Project Summary:

This project aimed to assess various sensors and their effectiveness on reducing risk and increasing returns to growers at 6 sites across South Australia. The results were very different based on the local growing environment. One of the sites was located at Yumali where there was a focus on improving management across limestone soils.

Key Outcomes:

- Combinations/ratios of the Dual electromagnetic (EM) layers was effective in predicting the location and depth of soil over limestone
- Gamma Radiometrics didn't appear to add any additional value over DualEM in this landscape
- CropSpec data showed the potential for zonal nitrogen management to increase yields
- Matching seeding inputs to potential yields resulted in over \$10/ha increase in profit across the whole paddock

Report:

www.sagit.com.au/wp-content/uploads/2014/07/PCT0111-Soil-Survey-Decision-Tree.pdf

For further details contact Felicity Turner
mf.turner@bigpond.com

Increasing the Uptake of Variable Rate in the SA Mallee

Proponent: Rural Solutions SA

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: January 2015 – February 2016

Project Summary:

Sixteen farmers from within the Natural Resources SAMDB boundaries have received agronomical and technical support to assist them in either making the initial step to using variable rate technology, or helping to better understand their existing systems.

Combining precision agriculture, soil testing, understanding soils capabilities, associated production risk and machinery capability has led to the creation of the prescription maps. The maps are individualised/unique for each farmer and consist of a prescription seeding and/or post application of fertiliser map

For further details contact Natural Resources
SAMDB Sustainable Farming Program 08 8580 1800
or 08 8532 9100

Investigating the application of unmanned aerial vehicles in agriculture in the SAMDB region

Proponent: Growing Solutions

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To demonstrate and promote the potential benefits of the use of unmanned aerial vehicles in the agriculture, horticulture, and livestock industries. Case studies from each of three properties (one livestock, one horticultural and one cropping property) will be developed to show the potential in paddock benefits of unmanned aerial vehicle use and also will contain economic analysis to identify any profit drivers which might accelerate the adoption of this technology. They will also compare and contrast farmers purchasing their own equipment as opposed to employing consultants.

For further details contact Leighton Pearce
leighton.pearce@gmail.com 0427 688 028

iSheep - Data Driving Management

Proponent: AgriPartner Consulting

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

'iSheep - Data Driving Management' will provide an on-farm demonstration of new sheep technologies which utilise electronic ear tags for improved data collection. The ability to easily monitor individual animal performance can provide producers with unprecedented information upon which to reliably and confidently make decisions regarding farm management. This project will deliver a number of extension materials and activities including a technical guide, case study, videos and an on-site workshop.

For further details contact Hamish Dickson
hamish@agripartner.com.au 0427 446 499

Mobile spray diary with location based automated weather import

Proponent: Wisdom Data and Mapping

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To create a website for mobile use which allows users to record crop spraying activities. This will be designed as a convenient on the go recording platform for spray activities with automated upload of associated weather information from local telemetric weather stations.

For further details contact Wisdom Data & Mapping
scott@wisdomdata.com.au 0429 844 654

Precision Pasture Management

Proponent: Monarto Agricultural Bureau

Funded by: This project is jointly funded through the South Australian Murray-Darling Basin Natural Resources Management Board and the Australian Government's National Landcare Program

Duration: March 2015 – March 2016

Project Summary:

To demonstrate and promote the 'Pastures from Space' technology as a means of receiving estimates of pasture growth rate (PGR) and feed on offer (FOO). This will use a Moderate Resolution Imaging Spectroradiometer (MODIS) satellite sensor to provide resolution and measurement of PGR and FOO at 250m². Focus farms will be established to conduct the demonstration and workshops held to promote the demonstrations to farmers. A case study will also be conducted and produced.

For further details contact Judy Paech
lucernebrae@internode.on.net 08 8538 5092

Smartphone Apps for Smart Farmers v2

Proponent: Ag Excellence Alliance Inc

Funded by: The South Australian Murray-Darling Basin Natural Resources Management Board and the Department of Environment, Water and Natural Resources, supported with funding from the NRM levy, South Australian and Australian Governments

Duration: September 2014 – December 2014

Project Summary:

The aim of this project was to update the 2012 publication “Smartphone Apps for smart Farmers”, and provide ongoing updates via a new page on the Ag Excellence website.

The booklet was updated and is available in three formats – the full edition, iOS or Android. These are available for download here:

<http://agex.org.au/project/smartphone-apps-smart-farmers-v2/>

Additionally, a “Farming Apps” page has been added to the website, and this section is being monitored and updated regularly: <http://agex.org.au/farming-applications/>

For further details contact admin@agex.org.au or
www.agex.org.au

Social Media in Agriculture

Proponent: Ag Excellence Alliance Inc

Funded by: Australian Government's Caring for Our Country

Duration: October 2011 – September 2013

Project Summary:

Social Media in Agriculture was an innovative project that explored the use of social media (You Tube, Vimeo, Facebook, Twitter, RSS, etc.) as an extension tool.

Through this project, short videos were produced and loaded onto social media sites to assist with delivery of agricultural extension around soil condition and landscape scale conservation in South Australia.

There were many uses for the video clips including:

- presentations at field days, conferences and other events
- providing instruction and demonstrations of new and innovative practices in the paddock through smartphone access via Vimeo and YouTube
- use in training activities and promotion of project achievements on the Internet for wide spread access

The project targeted the 15 farming systems groups that have an association with the Ag Excellence Alliance and its network partners including advisers, agri-business, relevant state and Australian government agencies and the state's eight natural resource management organisations.

The project supported the production of short videos that were loaded onto social media sites to assist with delivery of agricultural extension around soil condition and landscape scale conservation in South Australia. Grower group members and advisors also had the opportunity to participate in training in the use of social media and making videos, to allow to them to be at the leading edge of these technologies in the future.

For further details contact admin@agex.org.au or <http://agex.org.au/project/social-media-project/>

Training and Demonstration of PA in practice

Funded by: Grains Research and Development Corporation (GRDC)

Duration: 2010 - 2011

Project Summary:

The project aimed to take the level of precision agriculture (PA) adoption “beyond guidance” and to specifically increase the level of adoption of variable rate (VR) by growers by providing training and tools to assist them in achieving economic, environmental and social benefits.

Key Outcomes:

- Training of growers in software to allow them to implement PA activities on farm
- Trials and Demonstrations used for extension activities
- Where soil types vary significantly, economic benefits were received by implementing VR across both base (seeding) fertiliser and top dress nitrogen fertiliser applications.

Report:

https://www.google.com/url?q=http://www.spaa.com.au/files/catalog/spaa_trials_report.satc.kernick_2011.pdf&sa=U&ved=0CAYQFjABahUKEwjh57Sq-sPIAhVEyWMKHaXsCRA&client=internal-uds-cse&usg=AFQjCNEM29V1zsBkbK5XehK8KOpUQxkUuQ

https://www.google.com/url?q=http://www.spaa.com.au/files/catalog/spaa_trials_report.satc.williams_2011.pdf&sa=U&ved=0CAYQFjABahUKEwim593D-8PIAhVIkJQKHZUwDSc&client=internal-uds-cse&usg=AFQjCNGyKnwxmiz8NP_GGzTSYnioB_bykQ

www.spaa.com.au/pdf/143_SPAA_Trials_report_Harkness_2012_v2.pdf

www.spaa.com.au/pdf/107_SPAA_Trials_Report_SATC_VR_N_Long_2012.pdf

For further details contact Nicole Dimos
nicole@spaa.com.au 0437 422 000

