TwentyOne

THE FIRST 21 YEARS OF MALLEE SUSTAINABLE FARMING

Mallee Sustainable Farming

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The First 21 Years

THE HISTORY OF MALLEE SUSTAINABLE FARMING

2018 marks twenty one years since the first collaboration between the GRDC, CSIRO and local Mallee farmers established what was originally known as the Mallee Sustainable Farming Project.

Recognising the need to conduct Mallee specific research and extension, those early days were the first pages in what has become the proud history of Mallee Sustainable Farming.

For twenty one years Mallee Sustainable Farming has been leading the way in research, extension and practice change adoption.

This publication tells the past, present and future story of this proudly farmer-led organisation.

A story describing how MSF's ground-breaking research and extension work has fundamentally changed the face of farming in the Mallee.

Still faithful to that original vision, today MSF exists to assist farmers adopt even more efficient and profitable farming systems in the low rainfall, sandy soil Mallee region across three states.

Being farmer led from the very beginning has been one of MSF's enduring strengths allowing MSF to remain connected to our history, while keeping our sights firmly set on the challenges of the future.

The Mallee was a place once known for heat and dust, these days that dust now remains safely locked into productive paddocks, thanks in large measure to MSF's work in advancing, proving and promoting the advantages of improved farming systems, centred around the adoption of no-till.

Now into our third decade, MSF has developed a well-recognised reputation for the quality of our research, the shared value created from our collaborative research partnerships and proven practice change adoption driven by MSF's continued commitment to extension and active engagement with MSF members.

Introduction from our Chairman
Daniel Linklater

It's hard to believe that Mallee Sustainable Farming has been around for 21 years, was it really that long ago that a small group of progressive farmers recognised the benefits of establishing a locally based research, development and extension organisation?

Within those two decades MSF has grown to become vital to the profitability and sustainability of our farming enterprises across the three states that cover the Mallee. We value the relationships we have cultivated with farmers, researchers, and investment partners; and look forward to strengthening existing and establishing new collaborative partnerships into the future.

As the new Chair of MSF, a big part of my role will be continuing to advance the work of previous Chairs towards making MSF financially viable and sustainable into the future. MSF is fortunate to have a very capable board comprising farmer and specialist directors who are all passionate about advancing our members' productivity and profitability.

The MSF board is committed to building on our organisation's past success, and to continue to assist our members navigate the challenges and capture the opportunities of the next 21 years. A key element of MSF's success will always be tapping into the reliable support of our members; engaged local Mallee Farmers who play a valuable role in guiding the organisation's direction.

TwentyOne is a new way of reaching out to our members. The magazine is about taking a moment to look back on how far MSF has come in two decades and explore what the future of R&D might become. We hope that you enjoy reading this book and keep it so future generations of Mallee Farming Families can appreciate where we have come from and how we have always worked together to tackle whatever challenges may be ahead.

Daniel Linklater
Chair
Mallee Sustainable Farming

MSF looks toward the next 21 years...

2018 Daniel Linklater becomes 6th MSF Chairman. MSF wins Smart Farming Initiative funding to tackle Mallee Seeps. David Roget Award Winner Allen Buckley

2017 Conference held in Mildura marking 20 years of MSF. David Roget Award winner Dr Kath Cooper

2016 David Roget Award winner Danny Conlon

2015 David Roget Award launched with inaugural winner Michael Moodie

2014 GRDC Stubble Initiative Project started to maximise production in stubble retained systems. Winner National Landcare Awards – People's Choice Award

2013 Winner SA Ag Excellence Alliance Sustainability Award and the SA State Landcare Innovation in Sustainable Farm Practices Award

2012 GRDC Crop Sequencing Project started to determine best crop rotations

2011 Ian Hastings becomes 5th MSF Chairman

2010 GRDC Water Use Efficiency Project started to promote practices that help crops utilise more available water

2009 Winner SA Ag Excellence Alliance Grower Group Award

2008 10th Anniversary Research and Extension Forum. The N Management Tool to calculate optimum nitrogen applications is launched as part of the Reaping Rewards Project

2007 MSF expands into social capacity programs with Strengthening our Communities. The Grain & Graze project results in 6% increase in profitability for participating Mallee dryland farmers

2006 MSF Membership is launched at the Speed Field Days

2005 Jim Maynard becomes 4th MSF Chairman

2004 Allen Buckley becomes 3rd MSF Chairman. The Mallee Calculator (to calculate yield potential is launched)

2003 Tony Robbins becomes 2nd MSF Chairman. The five year Grain & Graze project begins. The Farmtalk fact sheet series is launched with Farmtalk 1 – Wind Erosion Control

2002 Winner National Landcare Research Award

2001 Winner South Australian Landcare Research Award (Finalist in NSW and Victoria)

2000 Winner NRE Hugh Mackay Award

1999 First Waikerie field day held

1998 Mallee Sustainable Farming is incorporated on 14th January. Gary Doyle is appointed 1st MSF Chairman

1997 In February, farmers from SA, NSW and Victoria met in Werrimull to discuss setting up a conservation farming project.

Andersons of Bronzewing

History on record

In the early 1900's as railway pushed along further and further through the Mallee towards Mildura around some of the railway watering point vital to steam train operations, small communities of hardy pioneering settlers sprung up.

So it was for Bronzewing, about 15km south of Ouyen where free settlers took up their blocks and set to work clearing the land with axe, fire and horses.

The stories of those tough days, as told by his grandfather, still live on for Geoff Anderson whose family has been farming at Bronzewing for more than a century.

In the 1930s, Geoff's mother started keeping rainfall records and that neatly transcribed information traces the patterns of good years, dry seasons and those rare times when the storm clouds delivered.

When Geoff took on the family job of rainfall recorder, he thought it might be valuable to expand the scope of detail being kept in those carefully stored notebooks adding comments about the season, the harvest, frosts and any limiting factors affecting yield.

He says the worst time was from 1992 through until the drought finally broke in 2010.

'It just didn't rain enough and at the wrong time of the year, we got no autumn rains, some years we got some winter rains other years we didn't. We seldom got decent spring rains for 20 years. We finished up never getting above average rainfall for that whole time.'

'It was frustrating that you were planning on having at least an average season and it never was. Even if you did happen to have an average rain, a big percentage of the rain was in November and December when it was too late to do anything other than grow weeds, which had to be sprayed or cultivated.'

Geoff Anderson says his rainfall records jog his memory to recall the best years. 'In the early 1970s we considered buying an aeroplane just for fun and quite a few of the farmers did. We never made that extra step, there was always something else to develop. We had such poor country we never had much machinery before that and the machinery we did have all got wrecked in rough country.'

1983 was another good year, good enough Geoff says to consider the future.

'I said, we will never have any more money than this, would it be a good time to get out? To quit and go and do something else, because these good times won't continue, which was very much right.'

Does he now regret not walking away? 'No you don't have regrets, it's the decisions you make, you live with them. It challenges you and makes you tougher and that develops your character.'

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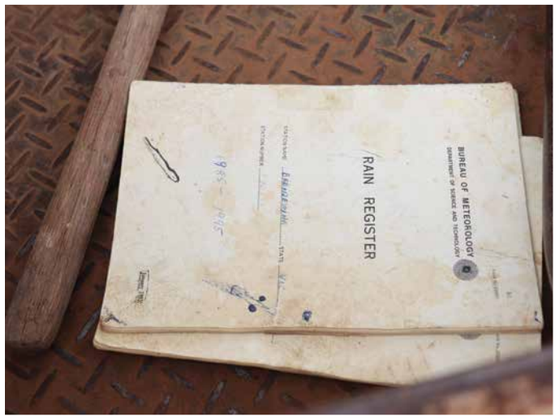

A HISTORY OF HEAT AND DUST

A place once known for heat and dust

Cultivation, farming with steel, working up the land every year – all of these not particularly Mallee suited farming practices meant the wide brown land paid a terrible price. Topsoil was blown away on the wind and when eventually rain fell even that precious moisture played a part in taking away the best of that fragile soil.

So when Melbourne skies darkened in the approaching shadow of regular dust storms, blame's fickle finger often pointed to the Mallee.

Dry, dusty and then even more dust. This was the Mallee in 1996

By the mid nineteen nineties patents on glyphosate had expired, leading to a dramatic price drop and a progressive expansion of no-till practice across Australia.

Farming sandy soils where average annual rainfall rarely goes beyond 350mm means Mallee farmers have traditionally faced tight profit margins, which tends to reduce the appetite for taking chances. Farming in the Mallee means we simply cannot afford to make mistakes.

Twenty one years ago fuel was cheap and a tractor in the Mallee would easily clock up 1200 hours a year, no problem at all, working up the soil and controlling weeds. Powerful cost incentives then to resist change.

No-till meant a radical change in equipment and farming system practice - an expensive and costly risk.

On the other side of the ledger was the cost of sticking with traditional farming methods, but this was a non-cash debt. It was a price paid by the land.

Photo courtesy of One Idea

Sustainability

By the mid 90's a small group of progressive Mallee farmers – pioneers - recognised that farming the old way, the way their father's always had, could just not go on forever.

The case was clear with soil blowing away before their eyes, fence lines that shifted each year until they were blown clear across the paddock and racked up against each other, three or four deep.

One simple definition of sustainability is the ability to look into the future.

Which makes considering sustainability as simple as asking the question - what decisions do we need to make now to continue doing this in 20 years?

For that modest association of Mallee grain growers, the risk of being the last generation in their family able to farm was a strong argument to counter the costly and potentially risky exercise of changing farming practice systems to embrace no-till.

They also recognised that implementing change on their own farms would not be enough. Even convincing farmers across the district was unlikely to produce the level of adjustment needed to ensure the future of farming in the Mallee.

That commitment to change, that resolve to try a new and better way would need to be equally embraced by everyone who shared the challenge of farming on sandy soils across three states in the low rainfall Mallee.

They knew that they needed three fundamental elements which when combined would lead to eventual adoption and practice change - as the only way to convince a sceptical audience of their peers, friends and fellow farmers.

The three pillars on which Mallee Sustainable Farming was founded remain as crucial today as when first considered:

- Collaborative research partnerships

- Locally conducted research, testing real solutions to Mallee issues

- Practical, hands-on engagement and extension along with the opportunity for growers to inspect trials and speak with researchers

Delivering those outcomes would need an organisation, an institution committed to long term sustainable farming practice change.

Their case to establish a permanent Mallee farming group dedicated to the interests of sustainability attracted interest and support from the scientific heavyweights at CSIRO and funding investment from the Grains Research and Development Corporation.

Clearing the air

How no-till brought an end to Mallee dust storms

In 1955 when Ken Bennett started working on his family's fruit blocks around Mildura there were a few things he could count on - a few weeks rest each May, hard, physical work for the rest of the year and regular dust storms so dense it was as if someone had simply turned out the lights.

Ken's grandfather first established his 44 acre selection just before the Great War, initially trying his hand at oranges and stone fruit, however limited drainage and no trains to take that hand grown produce to market meant a change of tact was needed.

Moving into dried fruits, mostly currants and sultanas became the way of life for Ken's father and uncles who expanded their operation with another block.

Ken recalls no one made a fortune in those days from the relentless yearly work schedule.

'Pruning lasted from early June till September, then irrigating all by furrow, monitoring that took up your whole day, then spraying, topping (cutting back the foliage) and the harvest started in the heat of early February. Six weeks picking under the summer sun followed by drying the fruit, a task which could last until May.'

Ken says dust storms were a regular occurrence with the prevailing westerly winds bringing massive clouds of eroded topsoil.

'The dust storms didn't last that long, maybe an hour or so, but they were pretty severe. It was just like turning the lights off, the sky would turn red. The dust in the fruit was a problem and we would be penalised for it.'

He says when grain growers first started to tackle erosion back in the 1960s by using blade ploughs that had some impact on the frequency of dust storms, but it was the arrival of no-till farming in the 1990's which finally cleared the air over the Mallee.

Ken says thanks to the work of Mallee Sustainable Farming in driving the adoption of no-till, dust storms are now only a distant memory.

'Dust storms are very rare now, I can't even remember the last one, it certainly has been quite a few years since we have had a severe one.'

'The dust storms didn't last that long, maybe an hour or so, but they were pretty severe. It was just like turning the lights off, the sky would turn red.'

MSF R&D

Trials and kitchen tables

There was once a time when you needed to visit state government-owned research stations to see the latest research and innovations being tested in the Mallee. Older Mallee farmers will still remember the Wanbi research farm in SA but it was when Walpeup Research Station closed in 2009, it became clear there was no going back to the days of government research stations.

From the very early days of MSF, Mallee farmers knew the value and need for local on-farm research. The Waikerie 'core site' in partnership with Allen Buckley and Jim Maynard's 'Kerribee' near Gol Gol in NSW became synonymous with MSF research and were hubs for the close working collaboration between local farmers, the CSIRO researchers who managed the core research, university and state government extension staff and local agribusiness.

With attendances reaching over 300 at the annual Mallee Sustainable Farming field day it's hard to find a SA Mallee farmer who hasn't visited the MSF Waikerie core site at Buckleys during that period, not to mention the hundreds who travelled from interstate or elsewhere in SA.

As the MSF research agenda evolved so did the on-farm field sites. But at the core of all the sites are generous farmers with a positive attitude to developing and demonstrating new practices for Mallee farming. Peter and Hannah Loller have hosted the MSF Karoonda site since the first MSF-CSIRO trials were established there in 2009 as part of GRDC's National Water Use Efficiency Initiative. It quickly grew to take over most of their home paddock with additional trials led by MSF, SARDI, PIRSA, University of Adelaide and agribusiness making use of the new focal point for southern Mallee research.

Like the previous MSF sites 'Karoonda' not only became a major venue for farmer visits, attracting well over 1000 attendees to the many field events at the site since it began, but it was the informal interaction that drives this type of MSF research. Researchers like Bill Davoren from CSIRO who managed the site became an almost daily fixture at the Loller lunch table, discussing the practical implications of the latest observations and debating the merits or otherwise of the latest ideas and issues arising on the farm and in the district.

The Merbein crop sequence trial site of Matt Curtis with Michael Moodie and SARDI, Robin Schaefer's Bulla Burra site at Loxton and the new trials at the Hastings Ouyen property are all examples of not just on-farm research in the absence of the old field stations, but examples of what lies at the heart of MSF research – bringing Mallee farmers and researchers together for better results for better Mallee farming systems.

Focus Paddock Innovation

An innovative feature of MSF in the initial years was the monitoring of 46 farmer focus paddocks across the three states. In early planning it was decided the three core research sites were to be set up at Waikerie (SA), Werrimull (Vic) and Euston (NSW) to conduct in-depth research on rotations, nutrition, soil microbiology, soil water, agronomy and tillage.

This was designed to understand the main drivers of farming systems and what needed to be done to improve the soil and lift production. Key landholders also expressed a strong desire to see research on more farmers paddocks, as farmers relate to what they see happening in their local area and using farm equipment in real life application. And so the "Focus Paddock" concept was born.

The monitoring of focus paddocks over 4 years was pivotal in the success of MSF. They provided important field research data on what farmers were achieving in a variety of soil and systems, as well as extension. There was excellent scientific information being produced from local sites which local farmers could readily relate to.

This sent a strong message throughout the region that farmers themselves were an integral part of what was being achieved, contributing ideas and owning the results. It was researchers, farmers and extension workers collaborating to help achieve the exciting changes that lay ahead.

Darren Nitschke & Chris McDonough

Each paddock was being managed according to the local farmer's situation. Some stayed traditional with conventional cereal, pasture and fallow rotations. Many moved to more intensive rotations, some modifying into no-till and trying alternative break crops.

The vital innovation to the Focus Paddock monitoring, along with the core sites, was the deep soil testing of pre-season and post-harvest moisture and nitrogen levels. While people would talk about the importance of subsoil moisture, this was the first time anyone seriously measured the "bucket size" and plant available water (PAW) in the soil. This had huge implications in understanding and managing cropping risk and opportunity and was a precursor to the development of programs like the Agricultural Production Systems siMulator (APSIM) and Yield Prophet.

Deep soil testing revealed the key soil drivers or limitations on yields and profits. Some sandy soils held lower soil moisture and often the nitrogen produced after pasture had leached low in the profile after summer rains and may not be available until late in the season, if at all. Many of the heavy flats were holding high levels of soil moisture and nitrogen, but this was often not available to plant roots due to subsoil constraints, such as salinity or boron.

The Focus Paddocks confirmed cereals roots would consistently draw soil moisture down to similar levels, defining the Crop Lower Limits (CLL). This was matched to detailed soil analysis to develop formulas for soil water availability against subsoil constraints and contributed to the development of the "Mallee calculator" and "Your Soils Potential" programs. These programs helped farmers define their cropping opportunities and risks along with their need to apply or reduce fertiliser applications at the start of each season.

By the early 2000's these concepts were actively applied with many farmer groups measuring their own "Red Hot Go" paddocks. The focus on understanding and utilising plant available soil moisture remained strong. In 2003 these pioneering results were shared, discussed and demonstrated across farmer updates across the Western Australian wheat belt.

After 4 years, the Focus Paddock monitoring came to an end. However, the information gathered on a variety of soils across the district and the farmer engagement, proved to be a vital and innovative part of the success of MSF.

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THE CORE OF MSF

At the core of MSF

It was after a run of dry years in 2008 when Peter Loller was getting ready to head out to an MSF group meeting, commenting he wasn't sure it would be relevant, as the research was being undertaken in other regions. His wife Hannah suggested to him "If they want to do any trials next year just put your hand up".

At the meeting Peter learned the CSIRO research team were after a new site to host the GRDC Water Use Efficiency trials and Peter did put his hand up to offer his farm for the new project.

The trial needed to be sown across 3 different soil types within a paddock and with the help of EM mapping it didn't take long to find the right paddock that fit the criteria, in fact locating the soils within 150m.

And so, it began in 2009; at first a GRDC Water Use Efficiency trial site and not long after a host of other researchers and trials were attracted to the paddock and a core site was born. When asked if this is what he was expecting, Peter replies the "more the merrier".

Chris McDonough & Peter Loller

Rick Llewellyn, Hannah Loller & Therese McBeath

Fast forward 10 years and the CSIRO trials are still going and Peter reflects on the journey. "The best part about hosting a core site is getting engaged with the projects. I've been able to ask plenty of questions with scientists sitting at my kitchen table". Peter adds, "The researchers are just as interested in what we are doing and how we need to do things as it helps them develop their research. And they have all been really great people which has made the conversations easy".

When asked what trials have had the greatest impact for Peter and Hannah in their own business, Peter is hesitant to name one thing. "The water use efficiency work and managing fertiliser on different soil types has been a big one for us but there are so many other little things we have picked up along the way through the many discussions with researchers".

Some days Peter and Hannah find themselves in the paddock directing people to the next potential trial site, showing them where to source water for spraying or helping them out with spare parts and repairs. "We've had days where we are standing in the paddock talking to the CSIRO team, Rick Llewellyn, Therese McBeath and Bill Davoren, and there may be another half a dozen staff tending to other trials in the background. Barely a week goes by without someone working on the trial site".

In 2010 MSF held it's first Karoonda Field Day which continued every year through to 2017. Over the years the site has had many visitors in addition to the annual Field Day event. Peter recalls the great number of visitors through the site, noting visits from International and WA agricultural groups as great opportunities to meet different farmers.

The link with MSF through the core site has been valuable for Peter and Hannah. The Lollers have enjoyed the varied conversations and shared learning with other farmers throughout the year as there is more than once source of information. "You only get one opinion from a consultant or adviser so we still feel we get a lot out of Farming Systems groups".

"The best part about hosting a core site is getting engaged with the projects. I've been able to ask plenty of questions with scientists sitting at my kitchen table"

Dr David Roget

Taking research from the lab to the paddock

For more than 30 years, Dr David Roget dedicated much of his career to the service of advancing agricultural research across the Mallee, initially in the field of soil-borne plant pathology and later on biological disease suppression and farming systems research.

As principal research scientist with CSIRO, David's hands-on commitment to his work created his legacy around taking research from the laboratory to the paddock.

As a leading proponent of developing and promoting the concept of farming systems research, bringing together multiple research disciplines with direct grower input, David was a key player in establishing Mallee Sustainable Farming.

His work had a profound impact on reducing soil erosion and increasing the profitability of cropping in the Mallee, creating guidelines for optimising performance which are still a valuable reference today by matching inputs to crop requirements, soil capacity and seasonal opportunities.

David's work highlighted that the use of current technologies in intensive cereal production provided the most economically beneficial and environmentally sustainable farming system in the Mallee's low-rainfall environment.

One of the keys to David's impact might have been in his approach of not just reaching out to growers - David Roget was delivering the message to the whole system, including those engaged in extension and research.

Dr David Roget passed away in December 2013.

To honour and preserve his legacy Mallee Sustainable Farming created the David Roget Mallee Sustainable Farming Excellence Award.

The inaugural winner of the annual award in 2015 was respected agronomist with Moodie Agronomy, Michael Moodie. In 2016, the award was presented to Danny Conlan, a trusted agricultural advisor with Dodgshun Medlin and in 2017 the award was presented to Dr Kath Cooper, a highly regarded scientist, formerly with the University of Adelaide.

In 2018 the David Roget Mallee Sustainable Farming Excellence Award was presented to Allen Buckley who has been involved with Mallee Sustainable Farming since 1997. Allen's property Glenrae near Waikerie was the first MSF South Australian core trial site.

Since that time, Allen has actively encouraged research into the best management practices for Mallee dryland farmers. He was MSF Chairman from 2004 to 2005 and bestowed with Life Membership in 2008 for his outstanding contribution to Mallee Sustainable Farming Inc.

Bringing together multiple research disciplines with direct grower input, David was a key player in establishing Mallee Sustainable Farming.

Mallee dryland sustainable agriculture

Strategy for 2017-23

Over the past 30 years, enormous change has occurred in the way the agricultural land is managed in the Mallee, driven by a common will to minimise soil erosion and increase productive capacity. Cultivation has been reduced, the area sown to crop has increased, stubble is mostly retained, and grazing management has improved.

Farming in the Mallee continues however to present an often unique set of challenges. Population decline and reduced social capital; increased business risk; a warmer, drier and more variable climate; and ongoing modifications to management practices in response to changed production systems all represent issues currently faced by our dryland farmers . Conversely, improvements in technology and advances in science continue to provide a positive platform upon which the future of agriculture in the region can be further strengthened.

The Mallee Dryland Sustainable Agriculture Strategy represents the efforts of regional delivery partners to establish a co-ordinated and collaborative planning framework which builds on past achievements to increase productivity outcomes, improve on-farm resilience, and enhance collaboration between stakeholders.

Completed in late 2017, the Strategy draws primarily on the experiences and expertise of local providers of dryland agricultural programs from Agriculture Victoria, Birchip Cropping Group, Mallee Catchment Management Authority and Mallee Sustainable Farming. Input from broader industry and community representatives also ensures that the priorities and expectations of key stakeholders have been captured.

Collectively, this partnership has set the following aims for the Strategy:

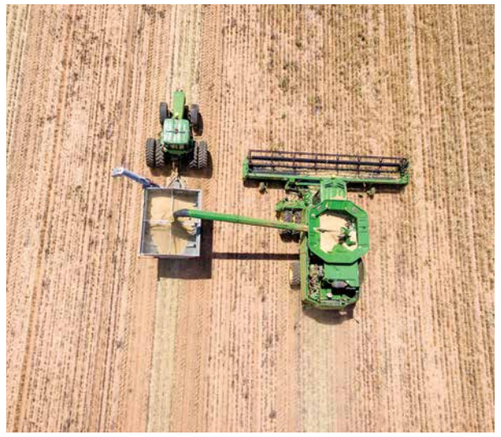
- To strengthen sustainable agriculture in the region over the next six years through strategic and practical measures;
- To provide a regionally coordinated approach towards sustainable agriculture that enhances and builds relationships between the region's service providers, producers, manufacturers and consumers; and,
- To support future investment and additional resources to achieve sustainable agriculture in the region.

To achieve these aims, 15 individual strategic actions or priorities for future effort are identified under four themes.

A full copy of the Strategy can be downloaded from: www.malleecma.vic.gov.au

The regional delivery partnership is committed to proactively working together to achieve the stated outcomes and objectives, recognising that success will require the enthusiasm and support of all partners who, collectively, will be responsible for implementing the actions contained within the Strategy.

www.malleecma.vic.gov.au



mallee catchment management authority · BCG · Mallee Sustainable Farming · AGRICULTURE VICTORIA

VISION
To optimise the productive capacity of Mallee dryland agricultural landscapes, while enhancing our natural and cultural landscapes and communities

Key Theme: Soil Health and Productive Capacity	Key Theme: Farm Business Risk, Viability and Resilience	Key Theme: Pests, Diseases and Weeds	Key Theme: Regional Infrastructure and Capacity
Objective: To maintain and enhance the productive capacity of Mallee soils, while improving and sustaining the profitability of the agricultural sector	**Objective:** To identify and manage farm business risks for a sustainable, competitive and diversified agriculture sector in the Mallee	**Objective:** To support land managers in the Mallee to minimise the economic, social and environmental impacts of pests, diseases and weeds	**Objective:** To support stakeholders to improve infrastructure, increase connectivity and enhance wellbeing and participation of our agricultural communities
Outcomes: Improved soil health Application of improved soil management practices Increased confidence to implement change (on - ground)	**Outcomes:** Increased capacity to adapt and respond to change	**Outcomes:** Improved prediction and control of emerging outbreaks Recovery from pests, disease and weed impacts	**Outcomes:** Partnerships established to promote quality, cost-effective infrastructure that meets the needs of the dryland agricultural community
Actions: 1 Improve understanding of the spatial variation in soil type and landform, the productive capacity of soils and extent of threats (physical, chemical and biological constraints) to soil health in the dryland agricultural region 2 Enhance collaboration between research and extension to promote skills and knowledge transfer in the agricultural industry 3 Deliver targeted extension activities that promote sustainable agricultural production systems, improved land management practices and improve farm productive capacity (including understanding productive capacity in various climatic scenarios) 4 Engage and support land managers to understand and adapt to new technologies to improve on-farm monitoring, efficiency and management (case studies, pilots, targeted extension programs)	**Actions:** 5 Encourage a culture of diverse, adaptable and flexible farming systems that minimise risk and enhance viability 6 Co-operatively manage unproductive land for competitive advantage and investment in supply chain activities 7 Support economic research in the Mallee including yields, farm performance and earning capacity, transition options, production costs, and trends in local and global markets 8 Increase collaboration to bring climate change readiness, productivity improvement and validation research into the Mallee (including solutions for land managers facing long term declines in rainfall and implications for heavier soil types)	**Actions:** 9 Encourage an anticipatory and adaptive approach to pests, diseases and weeds management and encourage and support multiple control mechanisms (including uptake of innovative cost effective ways to reduce chemical use and resistance) 10 Targeted compliance against regulatory requirements to support sustained community-led action 11 Collaborate and strengthen partnerships to manage weeds and pest animals on public and private land 12 Work collaboratively to implement sound biosecurity practices on-farm including quick and simple measures which can be built into everyday practice	**Actions:** 13 Collaborate and advocate for new investment (regional, state and national) in regional and community infrastructure improvements and improved digital connectivity 14 Increase collaboration to support greater recognition of dryland agriculture as an important economic driver with regional development organisations 15 Collaborate and strengthen partnerships to support healthy and vibrant rural communities

Figure 1 | Mallee Dryland Sustainable Agriculture Strategy: key themes, objectives, outcomes and actions

A whole new world beneath our feet

The Mallee's unique and exciting microbiology

Before Dr Gupta Vadakattu Principal Research Scientist in Soil Microbiology with the CSIRO began his research project with MSF there was a broadly accepted view that the Mallee's very low soil organic matter levels meant there was unlikely to be a diverse soil biota.

This starting point put the Mallee's soil microbiology in a different place from other Australian soils in other environments which typically have more clay, higher rainfall and greater levels of organic matter.

Managing and improving beneficial biological functions in cropping soils was one of the main aims of Gupta's study to better understand how yields could be increased with an economic return from targeting microbiology to achieve a sustained improvement in Mallee soil health.

One of the major research findings was appreciating just how inaccurate that old perception really was. Mallee soils actually host a diverse microbial community and that maximising the benefits from their activity means nurturing the microbes through proper management.

This understanding enabled Gupta to come up with a new motto 'feed the microbes and they will do the job!'

Gupta describes the microbial life cycle in the Mallee as being in a constant boom-bust cycle of food (carbon as energy) and moisture, which means to get the maximum benefit from the biology they need to be given a helping hand with energy and nutrient sources as well as adopting management practices such as stubble retention that retain moisture for longer periods

He says in the Mallee soils most of the biota are located in the thin surface 5cm layer of the soil and that surface soil needs to be protected from erosion by adopting conservative management practices.

Managing and improving beneficial biological functions in cropping soils was one of the main aims of Gupta's study to better understand how yields could be increased with an economic return from targeting microbiology

'Microbes in a Mallee soil are in an open habitat which means they are quick to respond to management, because they are highly responsive microbes need to considered when developing a new cropping system or a management practice.'

Soil microbes in the Mallee provide a multitude of valuable services related to nutrient (N, P and S) supply, nitrogen fixation, disease suppression, soil aggregation etc. for a productive crop and a healthy soil ecosystem. Improving the total biomass of soil microbes by adopting conservation management practices will give immediate benefits through increased nutrient supply capacity and reduced losses through leaching. Increased microbial activity would also help with reducing the persistence of agrochemicals.

'Looking for a longer-term increase in microbial activity beyond five years means relying on conservation cropping practices like stubble retention, no-till and avoiding no-crop fallow rotations. This will modify the microbiology, building up a resilient microbial community which will suppress disease and reduce crop losses from soilborne disease'.

Gupta says one of the key elements which has made this research project so successful has been the close interaction between researchers and farmers. With Mallee cropping systems being in such a highly dynamic environment combined with soils low in organic matter, this two-way participatory approach to research and biology management will remain a key part of achieving a sustainable agricultural system in the Mallee.

'Microbes in a Mallee soil are in an open habitat which means that they are quick to respond to management.'

Dr Gupta Vadakattu
Principal Research Scientist in Soil Microbiology with the CSIRO

Bill Davoren & Gupta

Collaborative grain

Research in the grains industry

Online Farms Trials (OFT) is an innovative, online technology offering new insights on a range of grain cropping topics, issues and methods in the Mallee and across Australia.

Developed as an initiative between the Grains Research and Development Corporation (GRDC) and the Centre for eResearch and Digital Innovation, Federation University Australia, OFT provides open and free access to on-farm, or field based, cropping research trial data and information.

Development and ongoing management of OFT has been supported through close collaboration with the grains industry including grower and farming systems groups, research organisations, agricultural experts and grain industry organisations.

Interactive maps, searching and viewing tools are provided to enable quick and easy access to relevant information. Online analytical tools provide access to data about break crop performance and sequencing, the selection of appropriate crops, and crop rotations for improving farming profitability and sustainability.

OFT contains more than 6000 trial projects, 80% of which are publicly accessible, with over 400 Mallee focused trials available. Mallee specific data is available for diverse topics, including crop sequences and their effects on soil nitrogen, Rhizoctonia disease risk and brome grass management. Trial data is also available on stubble management, sowing strategies, nutrition management on sandy soils, pulse options with their practicality and profitability assessed, and risk management strategies for growing canola and other oilseed crops.

Through ongoing industry engagement and research activities, OFT offers a central online source of knowledge and information that can shape the future of the global food system, and future farming in regions such as the Mallee

www.farmtrials.com.au

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

Centre for eResearch and Digital Innovation (CeRDI) | Federation UNIVERSITY·AUSTRALIA

David Roget & Jim Maynard

Ian Hastings presenting Jim Maynard with MSF Life Membership

2005 MSF Board

On The Board

Going back to the early 2000's Jim Maynard first became involved with MSF to learn more about modern Agriculture. Based near Gol Gol NSW, Jim found there weren't many trials established on Belah soils types similar to his own farm.

Jim recalls attending a forum at Red Cliffs where Gupta was giving a presentation on soil microbes and looking down a microscope to learn more about the soil. He fast became interested and keen to learn more, and was approached to have a trial on his property.

In 2002 Jim joined the MSF Board, and then in October 2004 became Chairman; a role that would continue until 2010. Jim thoroughly enjoyed his time on the Board and the support of fellow Board members. He relished the challenge, and was able to build his governance skills. Jim also found meeting the many and varied people intriguing and was particularly fond of David Roget who he says was more than a scientist but also a true friend. In 2011 Jim was awarded MSF Life Membership.

"The early years were particularly good", remembers Jim. "MSF went through a real heyday period with a lot of interest at the start. Farmers could see the visual change in farming systems at the core sites and pulling in the experience from all three states was great".

After about 7 or 8 years Jim recalls the funding environment changing. The Ag Departments were starting to gradually withdraw their support and private consulting was becoming more popular. The ongoing drought in the 2000's also took its toll on the crowds.

Jim explains the hardest part of the job was trying to keep funding. Projects would come and go and trying to keep staff as some projects wound up and before other projects began was always hard. Jim also recalls trying paid membership, but that didn't work either as everything MSF produced already belonged to the farmers.

There were also many gratifying moments. In particular Jim talks of the 'Strengthening our Communities' project that worked with rural communities to build resilience and morale through the millennium drought. MSF worked so well with the communities that it was invited to apply for the funding again and again. The project lasted 7 years and reached over 9,000 participants.

On his own farm, being involved with MSF helped Jim move to no-till and continuous cropping. Break crops were also introduced along the way.

In September 2018, the annual rainfall on Jim's farm had been the lowest on record with windy conditions, yet there was no erosion. "We have seen a huge change in the landscape and dust storms are now a thing of the past", says Jim.

Accelerating Change

MSF has been fortunate to be involved with great people right from the beginning. The following reflections are from some of the key 'change agents' that worked with MSF during it's formative years.

Graeme 'Tom' McIntosh
Lower Murray Darling Catchment Management

Graeme 'Tom' McIntosh arrived at the Dareton Research Station with the Department of Agriculture in 1999, as the Rangelands Officer. In 2000 half of Tom's role was devoted to MSF running small farmer groups in the NSW Mallee.

One of his first tasks in 2000 was chasing headers with a small weigh bin to get accurate yield measurements from farmer's paddocks. Much was learnt from this exercise including how the Mallee system worked, which new methods were just being tested and would prove to yield well, and that it's a good idea to fill up the fuel tank before you leave Balranald just in case you miss Geoff Parkers turn off. Tom recalls Robb Fisher (Vic DPI) having to walk in to Euston for fuel and missed his appointment in town. Finally it was important to do what Gary Doyle and Marion Murphy told you to do, being from NSW.

Tom's other memories include planning for dust risk data collection with Michael Cashen using accurate methods from the Dust Guru John Leys (Dr Dust). Then there was watching the establishment of two trial sites in NSW, one near Euston and then Kerribee. Vision was provided by David Roget, Jeff Baldock and Gupta. Bill Daveron would be on the seeder and David would be jogging behind checking for accuracy.

The main project was led by CSIRO and sought to find a more sustainable farming systems with less dust and less recharge, and more profit which came from more crops, in more years with more fertiliser and adequate yields.

The information from the erosion risk roadside surveys and trial sites was extended to farmers in NSW through the NSW DPI /MSF cropping group and the field days. This was trying to achieve change in cultivation so that the risk of wind erosion was below a target set using science and the Lower Murray Darling Catchment Management Authority objectives.

As the year went, Marion Murphy applied for funding for a series of NSW focus paddocks which were cored for soil moisture and data was collected for erosion risk. Paddock reports estimating nitrogen were developed using a calculator dreamt up by Chris McDonough from SA.

The farming systems have really changed since MSF began. Crops are planted in most years, dust risk is low and when Tom left the Mallee in 2013 profits were up.

Darryl Pearl
Ag Victoria Extension Officer

"In the early days although change was slow, it wasn't hard, as there was genuine interest from farmers to improve their farming system. The key messages were in moving farming systems toward no-till, improving fertiliser input and management and highlighting the opportunity years for break crops in the rotation.

We worked with key researchers such as Jack Desbiolles, David Roget and Gupta and held farm trials, field walks and workshops. Activities that promoted farmer to farmer engagement were really important as we had a core group that were trialling new things and sharing their experiences with others

We had the unique benefit of CSIRO, the VIC, SA and NSW Ag departments, and the Mallee CMA, SAMDB NRM Board and Local Land Services all working together for the benefit of MSF farmers. The change was coming but the partnerships brought in outside knowledge and experience which helped fast track the change.

The highlight for me was the change in farmer language over time. It went from farmers talking about how much rain they needed to a greater understanding of their soils, the moisture holding capacity and what was plant available".


Michael Moodie & Therese McBeath


Graeme 'Tom' McIntosh & Geoff Parker


MSF Research & Extension Team, 2006


Bill Davoren, Rick Llewellyn & Ben Jones


John Leys with a farmer group

Jeff Baldock

Dr Therese McBeath
CSIRO Research Scientist

"Farming systems groups are vital for better connections with a broad network of growers so that our research is grounded in solving real world problems. Combining with groups also means that our projects have more diverse skill sets enabling us to deliver R, D and E that covers a range of management strategies and a broad geography. Thanks to all the Mallee growers and advisers who share their stories with me, as it has a huge impact on how I approach my research.

In terms of projects the Water Use Efficiency initiative was a great project for me personally and my first working with MSF. The project was nationally connected, our results had good impact and broad relevance and I was able to learn a huge amount in a relatively short amount of time.

However, our greatest project outcome has been demonstrating that we can't get away from the fact that nitrogen is a massive driver of productivity and profit-risk in Mallee environments and we need it from both fertiliser and legume N to be sustainable and productive".

Bill Davoren
CSIRO Research Officer

Behind the scenes Bill has been a permanent fixture at the core sites and other MSF trial sites since 1999. In that time Bill has been involved with managing trials as well as presenting at field days and is often seen working in close proximity to a white ute parked in the middle of a trial paddock. Over the years Bill has been involved with 211 trials. Although some were not directly tied to MSF, the vast majority were and all were located in the Mallee.

Over the last 10 years, Bill has kept a running total of his field trips which add up to 700 days. In the last 3 years Bill has averaged over 90 trips per year and comments he has never been busier with field work. By September 2018 Bill and his team had collected just under 1000 soil samples, however, in a high sampling year CSIRO have collected over 0.5 km of soil cores split into 2200 samples"!

Dr John Leys
Research Scientist with the Department of Land and Water Conservation

John was with MSF at the beginning in 1998. He managed a number of focus farm field sites to measure erosion risk across the tri-state area in different farming systems as well as working on the core sites at Waikerie and Keribee. John's work on soil erosion and prevention laid the groundwork for the positive changes we see in the landscape today.

John says many people contributed to the groundswell of change. People like David Roget's work understanding soil profiles and demonstrating that sand hills don't store as much soil water as the flats; thus less fallow time. People also loved hearing about Gupta's soil bugs. It gave everyone a better appreciation of the soil being alive with biodiversity and why some agricultural chemicals could hinder their ability to fix nitrogen. There were also many other dedicated farmers, Board members, MSF staff and researchers that made the project a real team effort. One outstanding feature was the collaboration between CSIRO and the extension agronomists from the state Ag departments and farmers.

John recalls in 2002, the drought conditions caused a hell of a mess. Erosion was not being controlled and the visual impact of widespread soil drift prompted many to change their systems. Moving to no-till seemed to gain momentum as the science was there at the core sites to support it and provide solutions for local application.

Many things we tried on the cores sites were also trialed on local focus paddocks. This was a way of ground truthing what we learned says John.

Over the years MSF has gained prestigious recognition particularly from Landcare. This was because the project showed how profitable sustainable farming systems also delivered environmental benefits. The project clearly demonstrated how research could be transferred from the research sites to the farmer's paddock. The outcome of the project was the successful adoption of improved practices across the tri-state region.

Dr Rick Llewellyn
CSIRO Research Scientist

"Most of our research is conducted in collaboration with farming systems groups for very good reason. It leads to better research outcomes with greater potential for impact. And while you have researchers working closely with farming systems groups you're always in a good position to co-develop the next project ideas, making sure they're in line with what growers see as a priority.

With all of the work we have done it's hard to single out one project as the best as it's been a continual sequence of collaboration between MSF and CSIRO aimed at ongoing development of the farming system. But I have to say a personal favourite of mine is our recent work aimed at developing virtual fencing for our mixed farming systems. There's still a long way to go but without the input of MSF and its farmer members right from the very early stages we wouldn't be making the progress that we have seen.

Overall, the project outcomes we have seen so far have been a product of a whole lot of farming practice changes beginning with no-till and stubble retention and then conserving soil water in the summer fallow, improving the use of nitrogen based on soil types, being able to seed earlier while still managing weeds, and making use of an increasing range of crop options.

Looking to the future, I think our new projects on addressing constraints on sands as well as the potential innovations for improved grazing on mixed farms offer a lot of potential gains. I can see more emphasis on research and practices that offer greater logistical efficiency for large cropping farms – helping growers manage more crop in a more timely way with less risk. And that's the type of research that needs strong grower input".


Lake Mungo Leadership Camp


Peter Blacket & Gemma Walker


Ian Hastings, Gemma Walker & Stuart Putland

Looking back at

Strengthening Communities

When the millennial drought stretched its long, dry reach across most of Australia, the toll from that prolonged struggle was felt nationwide and the Mallee was certainly not spared.

Even for a region relatively well used to long periods without rain, the wait for the drought to end in 2010 seemed like forever for the communities across the three states of the Mallee.

Mallee Sustainable Farming played an important role in the post drought recovery – securing Commonwealth Government funding and rolling out the 'Strengthening our Communities' program designed to help Mallee farming families find their way back by using the power of a community combined.

The program ran a wide number of different activities from 2007 to 2014 with as many as twenty separate events underway in any given year. Ranging from social outings for kids with the combined schools leadership camp to Lake Mungo, purchase of community infrastructure such as BBQ trailers, and shade sails for community areas, to football games, community dinners and even guitar lessons. Over the 7 years that Strengthening our Communities funding was received over 9,000 people from the MSF Mallee area participated in the program.

Coming as the long drought ended, the Strengthening our Communities program administered by MSF brought funding and support for local communities to determine what they thought might be the best way for them to recover, generating local solutions for locals.

Some examples were the Wetlands Art Project at Pinnaroo, SA, where the community received a boost in morale and a visit from artist Helen Crawford to develop mosaics for the wetlands. While across the border in Euston, farming women arranged a special day to share their stories and challenges with obtaining adequate telecommunications and internet access.

In Victoria, a number of upgrades to community spaces helped provide better facilities for people to come together. This included purchase of new ovens, painting and roll out turf for a community lawned area.

The Strengthening Communities project was significant for MSF in that it saw the organisation diversify into social programs, recognising the important role that rural communities play. MSF was able to achieve the project objectives of developing partnerships and formulating local initiatives, building skills, increasing access to farmer support systems and building morale in drought affected rural communities.

MSF Wellness Initiative

Gemma Walker was Executive Manager with MSF from February 2011-October 2014 and contributed to delivering of the Strengthening our Communities project across the MSF region.

Gemma says, 'The Strengthening our Communities project was an incredibly powerful way of drawing together a wide cross section of people from farming communities and connecting them with others who could help them to enhance existing skills or learn new ones; create opportunities for laughter in tough seasonal conditions and open doors to a range of possibilities".

During Gemma's term as Executive Manager, she recalls there were 2000 grower members and 40 projects on the ground. This was made possible through the strong connections of the highly skilled Board, staff and consultants. MSF was in the enviable position of being regularly approached by a broad range of organisations to partner on new and existing projects.

Gemma found that the project trial site hosts made an enormous contribution to MSF. Growers who hosted single or multiple projects gave willingly of their resources and enthusiasm for the benefit of all growers in the region.

They were valuable in creating opportunities for peer to peer learning using small scale trials and large paddock demonstrations. The researchers and consultants who worked with these growers were an integral part of the learning process and were often deferred to in developing new initiatives based on what they had discussed with the trial site hosts or their observations from the trials.

MSF Farmer Group Extension in SA

Chris McDonough, *Insight Extension for Agriculture* (formerly *Rural Solutions SA*)

When MSF first started the prevailing view held by many local farmers was simply that no-till would not work in Mallee.

The no-till narrative generally covered you can't intensively crop because the ground needs a rest, it is too risky to apply high rates of fertiliser (urea was hardly being used) and summer weeds were mostly controlled by grazing and cultivation.

In those days the Mallee would average at least two complete district rolling dust storms a year and yet plenty of people held faith with the concept that 'where she blows, she grows.'

With the tide of opinion flowing steadily in one direction it was probably not surprising that there was also a very strong aversion to taking risks, particularly in such variable low rainfall country.

Turning those contrary voices around was one of MSF's early successes, a change campaign that relied heavily on interactive farmer-to-farmer discussion, more often than not including hands-on inspection of on-farm application.

These group activities helped people change their minds and eventually change their farming systems by demonstrating that they were not alone, they were part of the MSF community and working through similar challenges together.

While the Core Research and Focus Paddock farm results were used to lift farmer's vision by showing us 'what was possible' the MSF supported local farmer group activities were very focussed on 'how do we make it possible for us… on my farm, with my equipment, on my soils, in my situation.'

For Chris McDonough (PIRSA Agronomist) his job as a group facilitator was to help farmers to change by improving their capacity to adopt new sustainable farming practices.

For example, chief researcher David Roget was asked at an early Waikerie Core Site Field Day, 'If you were a

Mallee farmer, what's the first thing you would do?' to which he replied 'I'd find out about my subsoils' – ie. soil types, constraints and fertility to understand plant available water, yield potential, fertiliser requirements and manage risk.

As identified back then there was very little help available to allow farmers to actually do this for themselves. Which led to PIRSA, CSIRO and MSF collaborating to develop the "Your Soils Potential" program and the "Mallee Calculator" to be used with deep soil testing, to work out optimal cropping strategies. Each farmer would take on a "Red Hot Go" split paddock trial to try out something new. Deep soil analysis was done and actions planned with these farmers to gain confidence in implementing these new farming strategies and compare the results together.

This on-farm work, using a farmer's own machinery included new rotations, no-till, fertiliser strategies, summer weed control, understanding PAW and comparative gross margins.

Chris McDonough says they also used soil pit field days to aid the group discussions about managing their local soils, so they could visually see what their soils looked like, where the roots were going and where the moisture was, and practically relate this to their own paddock soil tests. On-farm application was encouraged through a network of 10 local farmer groups, directly involving over 200 families.

Other early MSF group workshops covered soil biology to root disease and nutrition along with grain marketing.

Chris says MSF was created around a model of sharing farmer feedback directly with each other and to the MSF original board, scientists and extension officers. Just as sharing ideas, feedback and planning R&D activities for the season ahead was vital when MSF was first established, so those same values of being proudly farmer led remain one of MSF's enduring strengths.

Deep soil analysis was done and actions planned with these farmers to gain confidence in implementing these new farming strategies and compare the results together.

Back to the future

Allen Buckley reflects on MSF's past and destiny

Some of the earliest memories of Mallee Sustainable Farming are not just held in photographs and stories for those who were there back in the day when the Mallee Sustainable Farming Project kicked off in 1997, people like MSF co-founder Allen Buckley, the origins of MSF are much more personal.

When the GRDC developed the concept to support a tri-state foundation meeting to consider establishing a conservation farming project in the Mallee, Allen and those fellow farmers who recognised the need to tackle Mallee farming challenges with specific Mallee research & development started working together to establish the first GRDC funded farming system group in Australia.

MSF was the turning point for research, changing traditional research often too focused and specific, to a new model that would take an issue and investigate it across the entire farming system. MSF also brought researchers out of their institutions and out in to the paddock where farmers and researchers could have 'a meeting of the minds'.

Collectively farmers and researchers like David Roget, Gupta, Jack Desbiolles and Jeff Baldock, were trail blazing in the approach to farmer driven research. This approach would provide farmers like Allen the opportunity to discuss ideas on farm and for the research team to help put them into practice.

Allen also acknowledges the many other research staff that followed over the years, such as Rick Llewellyn, Nigel Wilhelm and Michael Moodie. 'I have nothing but praise for all the researchers involved'.

Clearly not shy in voicing his opinion, Allen's same passion which drove the creation of MSF continues. His enthusiasm and commitment to a better, more sustainable future outcome for Mallee farmers shows no signs of abating in 2018.

'The reality is that on my place no-till is at the end of its life – after twenty-two years on my farm in the current format, I don't believe there is any potential for further increased production from no-till from this point. For those who have only been in no-till for five years, they still have ten or fifteen years of production gains to be made.'

'For me I've got to find another way, I want to prevent the erosion issue from coming back, we need research to answer the question what's next? Legumes have shown potential, and combined with virtual fencing might be part of the solution and cover cropping could be another. Disc seeders in this combination could also be a real game changer.

Allen Buckley says it is a universal truth that ag departments in all three states have long ago given up extension and yet taking information generated by research and providing it to farmers is both a priority and a potential opportunity for farming systems groups like MSF.

He says there has been a continued growth in private agronomists taking the value in MSF's research, reformatting that information and providing it to their clients at a fee.

Allen says as MSF hits the twenty year mark, this would be the right time to review where MSF sits amongst state Ag departments, other Farming Systems Groups, funding bodies, private agronomists and our farmer members who need solutions now as desperately as when no-till first started.

'I don't have the answers, but I have plenty of questions, what is the vision for MSF in the next ten years? How big a role will research information play in MSF's future and can MSF use the strength and reputation for quality research to access an ongoing profit stream which would allow MSF to be sustainable for another twenty years?'


Feedlotting day

David Shannon, Allen Buckley & Dean Wormald

Adoption and practice change

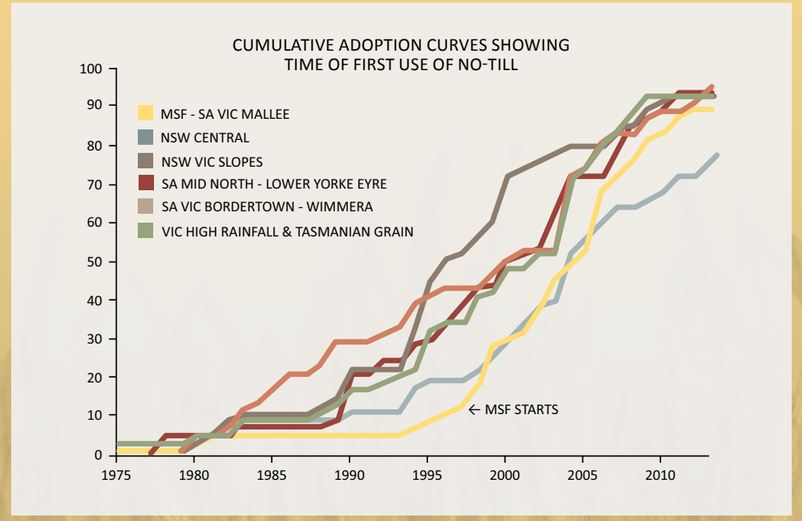
One of Mallee Sustainable Farming's most reliable performance indicators has been the organisation's capacity to promote practice change and adoption.

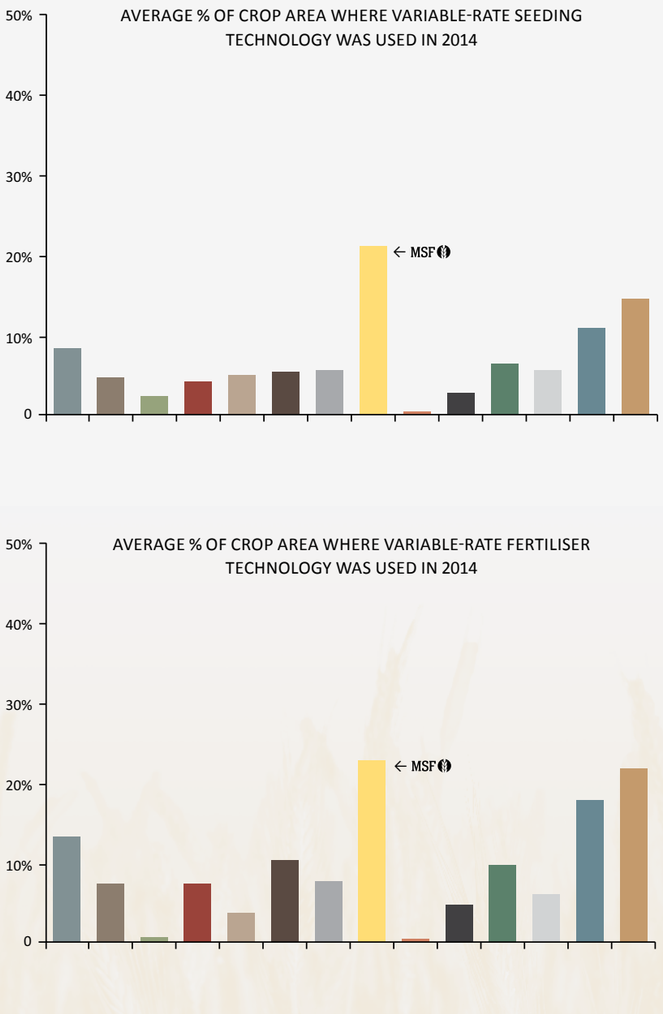
For grain growers in the Mallee, who had been much slower than their farming colleagues across the eastern states to adopt no-tillage stubble retention intensive cropping systems, the creation and intervention of Mallee Sustainable Farming literally turned that around.

As this graph showing time of first use of no-till across the southern Agro-ecological zones demonstrates, following the creation of Mallee Sustainable Farming, there has been a consistent and rapid adoption rate.

Beyond no-till MSF has been able to consistently influence adoption rates of grower members.

Five years ago 95% of the Mallee cropping area was planted to cereals. Now as a result of MSF's research leading Mallee farmers plant a diverse range of crops including field peas, vetch, lentils and chickpeas across 40-50% on average of their cropping area.





Some of the major areas for GRDC funded MSF research during the past two decades, delivering a profound impact on grain growing practices across the Mallee includes work on soil-specific management.

The SA-Vic Mallee remains the leading region in the country using variable rate technology (beginning with the GRDC-CSIRO Reaping Rewards project in 2005). Since then long-term trials at MSF field sites and profit-risk analysis have continued to encourage Mallee farmers to profitably raise fertiliser inputs on sandy soils.

RON HARDS - MILLEWA

Gone with the wind - *almost..*

When Ron Hards started farming in the Millewa nearly 50 years ago things were so different, reflecting on it now is almost like visiting another country.

Farming in a different Australia where glyphosate was prohibitively expensive at $420 for 20 litres, fuel was 19 cents a gallon for diesel (around 5 cents a litre) and working up the land was the only cost effective option for weed control.

Ron says while back then wind was enemy number one for erosion after ploughing - a summer thunderstorm would leave lakes of water across the paddock where rain bounced straight off the surface without sinking in and taking valuable topsoil with it.

He says season after season of watching the land blown away was so tough that several times he had the hard discussion with his wife about giving it away. Ron says around this time their son Nick decided to do an ag apprenticeship at Longerenong College and while they made the tough decision to stay, they also started looking for alternatives.

Actively involved in the Victorian Farmers Federation brought Ron into contact with South Australian farmers who had been doing no-till for some time. Their rainfall might be a bit higher than the Millewa District's 250mm average, but they were using no-till in similar sandy soils.

Ron says he firmly believed back then that the rainfall made all the difference, no-till would work in SA with higher rainfall, but in the Millewa it wouldn't work.

He says it was that early work of Mallee Sustainable Farming in conducting local trials of no-till that helped convince him to start looking seriously at making the change.

'MSF encouraged people to try something, I think it was fear of the unknown was the big thing, if you don't know what is going to happen, if you are going to spend big money changing your plant or trying new varieties and you have an outlay, you want to be pretty sure that you will get a return.'

Ron says MSF's research and extension efforts in those days really identified that Mallee farmers actually had the ability to do it.

'What you will achieve by making the change to no-till and demonstrating the financial return. MSF did all those things, establishing the financial case as well as the farming case.

'All the answers were there, you just have to recognise them.'

'We were one of the first to go no-till, we'd mucked around for a while trying to reduce tillage, using a bit of Roundup during the summer, spraying out summer weeds and that. Until we finally bit the bullet and bought some new machinery, we joined Danny Conlan's agronomy group and I said Danny, your job is to make sure we can do no-till and to make sure we don't go broke doing it!'

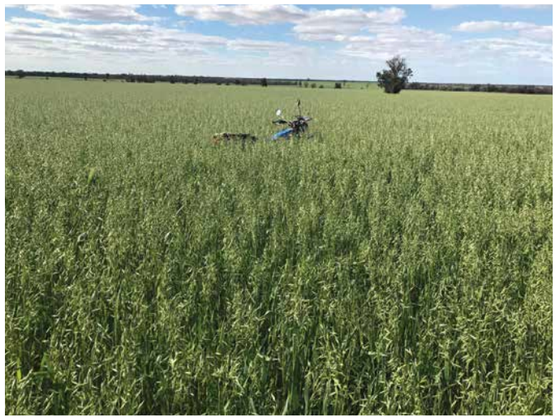
He says it has been a big turnaround and the land has recovered.

'The land is rebuilding, the fertility, the friability, ease of cultivation for seeding. It is so much easier now than what it was, the hardpan has disappeared, there was always a hard pan there that you couldn't get a machine to go into. When we first started, we trialled a chisel plough, it was just sitting there on top of the ground, it wasn't digging in, it was all just vibrating and screaming.

Ron Hards says those days have gone, disappeared. 'I've still got that plough and now it does the job easily with knife points and press wheels.'

'MSF has fundamentally changed the face of farming in the Mallee'

Millewa Carwarp Pulse Check Group



Ron Hards

STUBBLE INITIATIVE

Stubble Initiative

The evolution of stubble retention farming systems has been a long time coming in the Mallee. For most of the last decade the transition has been slow but steady towards preserving stubble and turning away from the old school methods of cultivation and erosive stubble removal.

In many ways stubble retention farming systems have been an enabler, making possible a lot of the things that Mallee farmers do now, like continuous cropping and using cropping diversity, pushing the boundaries of water use efficiency, improving crop nutrition. All of these innovations have been made possible by the adoption of stubble retention systems.

Mallee Sustainable Farming has played a major role in driving that change in stubble management practices across the Mallee, by partnering with researchers to increase the impact research has on its practicality and value for Mallee farmers. Supporting change and innovation with fields days, crops walks, demonstration sites and the opportunity to engage with researchers & advisors that allowed farmers to see the results for themselves in their own paddocks.

Stubble management is not always easy and in a low rainfall environment keeping enough stubble is often more challenging than having too much. Just how these new challenges can be worked around and just how those problems are addressed remains now as back in the day, a major focus for MSF.

Stubble management is not always easy and in a low rainfall environment keeping enough stubble is often more challenging than having too much.

Just as important as engaging farmers in person and the positive benefits that flow from being able to hold collaborative discussions with neighbours is ensuring that all that collective experience, what works and what does not is captured, preserved and made available to the wider audience of farmers across the Mallee in all three states.

In 2013 the MSF Stubble Management Guide achieved those goals, presenting a comprehensive, useful compendium of local knowledge, expert research and practical solutions.

The MSF Stubble Management Guide (still available for free download from msfp.org.au) formed the collective base for information gathered in the first decade of stubble management in the Mallee and paved the way for future initiatives.

That foundation document captured the process of getting in place a stubble retention farming system which opened the door to innovations like continuous cropping, use of break crops, early times of sowing, better control of summer weeds and moisture management.

Now MSF's continued research as part of the GRDC Stubble Initiative project continues to build on the lessons already learned, establishing new opportunities in the context of a stubble-retained farming system.

The Stubble Initiative research conducted at major MSF on-farm sites and in partnership with CSIRO at Loxton and Karoonda has highlighted practices for more profitable and sustainable stubble-retained systems. These include more profitable crop nitrogen strategies, new brome grass management options, seeding strategies for non-wetting sands and new fertiliser opportunities.

Effective stubble management has allowed farmers to combine modern technology, research insights and innovation to approach maximum productive capacity. That threshold has been achieved very rapidly with some Mallee farmers hitting their straps within the last five years.

The future direction for MSF stubble management research focuses on building on those earlier gains. Now that stubble management reliably underpins Mallee farming systems how can that platform be elevated again, how can those current maximum productivity limits be breached and what new methodologies can take us to that place?

Effective stubble management has allowed farmers to combine modern technology, research insights and innovation to approach maximum productive capacity

THE MUNRO FAMILY

Confidence key to no-till adoption

The Munro family has farmed land near Ouyen for more than a century.

Their forebears were part of the 'land rush' attracted to the region by the opening of the Ouyen-Murrayville railway line, government incentives, good rain and high wheat prices.

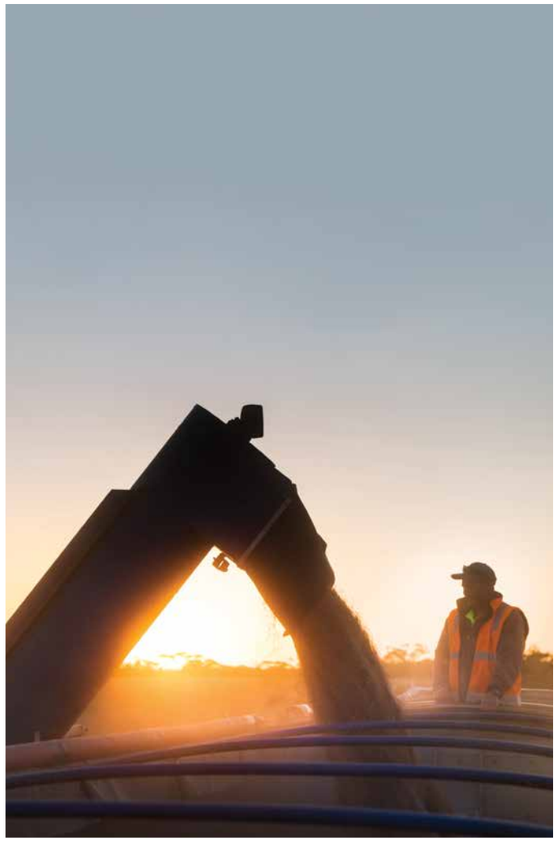
They cleared the Mallee scrub by hand and worked hard to make a living from cattle, sheep and grain crops in the hottest, driest part of Victoria.

But widespread clearing, grazing, and a four-year rotation that included repeated cultivation and years of bare fallow, had left the land in a fragile state. It was prone to wind erosion, which often displaced seed and young crops as well as the shallow top soil.

By the time Walter and Lindsay Munro finished high school and began working on the family farm in the 1960s with their father, Allen, and uncles William 'Gus' and Peter 'Mac', soil erosion had been recognised as the number one enemy of Mallee farmers.

The Victorian Government established numerous committees, and the Mallee Research Station at Walpeup in 1935,

Their forebears were part of the 'land rush' attracted to the region by the opening of the Ouyen-Murrayville railway line, government incentives, good rain and high wheat prices.



to develop and demonstrate ways of improving farming methods to reduce the severity of soil drift.

Teams of researchers and farmers scoured the globe for techniques that could be modified to suit the region's low rainfall environment and highly variable soils.

The answer was no-till systems, also known as conservation agriculture, observed in the US and Canada and adapted for conditions in Western Australia and South Australia.

Key components included minimum or zero cultivation, partial or full stubble retention to maintain soil cover and retain moisture, and the rotation of cereals, oilseeds and legume crops over time.

Walter and Lindsay first attempted no-till using discs in 1983. Unfortunately, the previous year's record low rainfall of 110mm was followed by 448mm and the crops dramatically failed in the wet conditions.

'That frightened us – especially Lindsay and me – off a little bit,' Walter said.

Twenty years later, once Walter's sons Deane and Jarrod had joined the partnership, they were ready to try again.

Jarrod said they were encouraged by Dodgshun Medlin agronomist Danny Conlan who was running discussion groups for farmers in the area.

'It hit home when we went on a bus trip to a few different areas and looked at farms where (no-till) had been adopted,' he said. 'We were convinced by the excitement we could see in those farmers and the basic principles of how it made sense to conserve moisture and nutrients in the soil.'

Farmer-to-farmer learning played a crucial role in the adoption of no-till across the Mallee. The willingness of pioneering farmers to share how they achieved better results was important for giving neighbours the confidence to change.

Long-time supporters of Mallee Sustainable Farming, the Munros have hosted numerous on-farm trials. Deane said the trials – especially those focussing on canola, legumes and carbon – had helped them further explore what was possible on a variety of soil types.

For two years the Munros used identical seeder bars with different configurations to sow part of their farm conventionally and part by direct drilling. By 2008, they had converted the conventional bar and the enterprise was completely no-till.

Walter and Lindsay first attempted no-till using discs in 1983. Unfortunately, the previous year's record low rainfall of 110mm was followed by 448mm and the crops dramatically failed in the wet conditions.

'We could see the benefits almost straight away," Jarrod said. 'The difference was especially noticeable in dry years, like 2008, we were getting better yields than we would have from conventional.

It wasn't massive, but it was something compared to the below average returns – sometimes we were only getting seed back - in the real dry years. Had it been conventional sown we wouldn't have stripped those paddocks at all.'

Lindsay, who now looks after most of the spraying, said no-till had been a game changer for their farm.

'We don't get the ground blowing, which is better for the environment,' he said. 'And we're also getting better results, even in drier seasons, because chemical control of weeds in summer holds the moisture better and we are getting better yields.'

Lindsay said dry season wheat yields had increased from 1.3t/ha to 1.7t/ha, a gain of 30%.

Deane said rolling 20-year average yields were at least 15% better than for the previous two decades.

The Munros have more than 10,700ha under crop, with about 45% dedicated to legumes for grain and hay.

The 2018 cropping program includes Kord and Scepter wheat, Spartacus barley, Bolt and Hurricane lentils, Genesis 090 chickpeas, Mandelup lupins, Brusher and Yallara oats for hay, and Rasina, Morava and Timok vetch.

Deane said the biggest impact from direct drilling and more pulse crops in the past five years has been on the heavier soils.

'It's really transformed our ordinary country - that's probably where the stark difference for me is,' he said. 'The ordinary country has picked up a lot more in comparison to the sand and the better country. It's taken the heavy country from just about a loss every time, to being quite profitable. I'm pretty excited about how it's worked for our farm.'

Lindsay, who now looks after most of the spraying, said no-till had been a game changer for their farm.

An enduring partnership

Successful sustainable agriculture

Natural Resources South Australian Murray-Darling Basin and Mallee Sustainable Farming have enjoyed a strong partnership for the past fifteen years.

During this time, the two organisations have collaborated on many projects throughout the Murray Mallee that include:

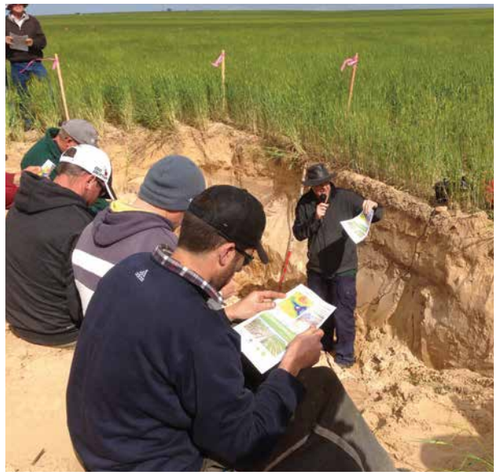
- Addressing key land and farming issues including soil erosion, Mallee seeps and pest plant and animal management
- Promoting the benefits of reducing soil erosion and the adoption of no-till farming systems
- Informing and engaging farmers in the latest agricultural research being conducted in the Mallee
- Testing and demonstrating new and emerging technologies to improve soils, crop management and sustainability
- Providing localised weather and soil moisture data to assist with farm management decisions through the Natural Resources South Australian Murray-Darling website.

Key outcomes realised throughout the Murray Mallee over the duration of this partnership include an increase in:

- Adoption of no-till farming practices from 40% of farmers to over 80% of farmers. This has greatly reduced the potential for soil erosion
- Adoption of practices to manage and improve water repellent soils. From 20% in 1999 to over 60% in 2017, notably through the adoption of precision sowing systems and agronomic practices in conjunction with soil modification and improvement
- Awareness of Mallee seeps and the potential impacts they can cause
- Awareness and understanding of the latest agricultural research relevant to the Murray Mallee conducted by a range of organisations.

The South Australian Murray-Darling Basin Natural Resources Management Board would like to take this opportunity to acknowledge the generous contributions made through a range of programs funded by the Australian Government, agricultural industry groups and other key partner organisations that have made these positive outcomes possible.

www.naturalresources.sa.gov.au



Government of South Australia

Natural Resources SA Murray-Darling Basin

Darren Nitschke

Challenging the profit from variable rate technology

In 2015 MSF joined forces with the Natural Resources SA Murray Darling Basin to create the Mallee Challenge. The aim was to produce high protein wheat across all soil types.

Under the rules of the Mallee Challenge, one quarter of a paddock was managed using the participant farmer's own Variable Rate Technology maps and rates, with three-quarters subject to varying treatments based on an EM map.

As part of the challenge the selected paddock was split into four zones; light sand, mid-slope, loam and heavy loam.

The primary purpose of the Mallee Challenge was to compare the different treatments and determine the ideal approach, which could ultimately help the grower modify, adjust and improve their VRT strategy.

For some growers like Lameroo farmer Peter Maynard the Mallee Challenge demonstrated that VRT improves profit by about $18/ha compared to the average of any single treatment.

'In an ideal world I would set the rates based on nutrient replacement considering what the previous crop used, but that way I could end up blowing my budget.

'Instead I set a fixed fertiliser budget and then after I decide my rotations I break that budget down to each paddock based on which crop I'm going to grow, then split down to each zone based on the soil type.'

Peter varies his urea between 5 to 110 kg/ha and phosphorus between 5 and 70 kg/ha, with light sands and mid-slopes receiving more fertiliser than heavy loams. Peter uses regular soil tests to confirm he is applying the right amount of nutrients.

Under the rules of the Mallee Challenge, one quarter of a paddock was managed using the participant farmer's own Variable Rate Technology maps and rates, with three-quarters subject to varying treatments based on an EM map.

'Soil tests only give a snapshot, but it's a good check every now and then.'

In addition to Peter's own strategy, three treatments were tested on each zone; high fertiliser (up to 60kg/ha MAP and 60kg/ha urea upfront), low fertiliser (30kg/ha MAP) and late nitrogen (60kg/ha post sowing).

As expected, the different soil types responded differently to the different treatments with the highest profitability coming from a combination of treatments incorporating late N on the light sand and mid-slope and low fertiliser on the heavy loam.

'The perfect margin, if all zones had the ideal treatment, was $470/ha, compared to an average of $425/ha if the same treatment had been used on all four zones. Using my VRT system the profitability was $443/ha, which is not quite perfect, but shows that our system is generally on the right track.'

Peter says he certainly recommends VRT to other farmers in the Mallee. 'Using VRT isn't costing me any extra; I'm still using the same overall fertiliser budget. It just allows me to spend the money where it is needed, and the Mallee Challenge showed that using VRT increased gross profit, so I definitely think it is worth the effort.'

'Using VRT isn't costing me any extra; I'm still using the same overall fertiliser budget. It just allows me to spend the money where it is needed'

Grow. More. Precisely.

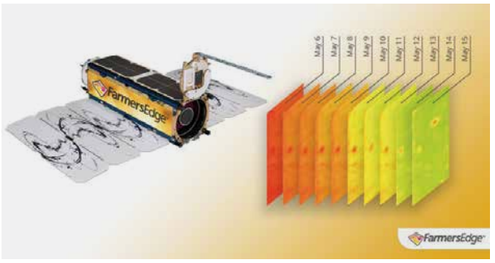
with ease using FarmersEdge

There are a lot of crop management tools which have been available for decades. Techniques such as yield mapping, variable rate prescriptions, weather stations and satellite imagery are not new to many farmers. What is changing is the way data is managed. Data aggregation, integration, cloud storage & processing, all allow us to see and display information better.

FarmersEdge grew from a Canadian based precision agriculture consultancy into a global big data decision agriculture business. While a lot of companies are still looking at how to make the technology revolution happen, Farmers Edge are already well down the path.

Nat Clark, is a Sales Agronomist with FarmersEdge based in Donald, Nat explains,

"The company has invested in daily data processing; standardised variable rate fertility & modelling; high-resolution satellite imagery; weather stations on every farm and can be accessed on either the web or mobile phones. This allows growers to manage their farming practices to find the most efficient use of inputs to maximise profit."



Visit: www.farmersedge.ca/au/
For more information contact:
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FarmersEdge™

Partners in productivity

Mallee Sustainable Farming and GrainGrowers are kicking goals for the industry

National grains representative body, GrainGrowers, is proud to partner with Mallee Sustainable Farming (MSF) in research, development and extension across the Mallee regions of South Australia, Victoria and New South Wales.

GrainGrowers Regional Coordinator David Evans said that the enduring partnership had always had one joint aim – to focus on ways to enhance the profitability, sustainability and efficiency of MSF grower members.

"Every year, MSF produces some amazing results in research trials and extension across the Mallee grain growing regions - including recently incorporating legumes into cropping rotations. Most importantly, MSF is led by farmers and for farmers so the research trials that are done are relevant to farming operations in the region," said Mr Evans.

The rapid advance of technology in agriculture doesn't stop at the farm gate. MSF and GrainGrowers recently joined forces to investigate innovative ways of using technology during MSF events.

GrainGrowers provided funding for MSF to purchase an audience interactive system. This gives presenters at MSF field days and events, who have in the past only answered audience questions, the means of being able to ask questions of their audience.

Each member of the field day audience is able to respond via handheld keypads with the results shared with everyone in real time on a large screen.

This interactive technology is only now being rolled out. However, by the time MSF produces its 41st Anthology, investments like these by GrainGrowers will be seen as the leading edge of research extension and engagement.

David Evans says GrainGrowers is proud to work alongside MSF: "It is a partnership which encapsulates GrainGrowers' goal of developing and promoting a more efficient, sustainable and profitable grains industry for all Australian grain farmers.

"Supporting innovation is an important part of achieving our vision and we welcome the chance to be involved now and in the future with MSF's vital work."

www.graingrowers.com.au

Top: David Evans from GrainGrowers

Connecting the dots

It took more than an abiding affinity with the land to bring an accomplished young accountant named Ian Dodgshun back to the Victorian Mallee.

He also was driven by a poignant sense of injustice: that the "top end of town" in Melbourne was ignoring country people, especially farmers.

At that point, Ian resolved to return to his hometown of Swan Hill and dedicate his career to bringing quality professional services to rural communities.

After 20 years he decided it wasn't enough to provide financial counsel to Dodgshun Medlin's farming clients, some of whom had been with the firm since its doors opened in 1957.

Ian was troubled by the lack of agronomic guidance that was independent of chemical resellers.

"We always felt we could support clients to make the most of their income," Ian said. "But we wanted to take a step back and help them focus on ways to improve the profitability of their enterprise and increase that income. This would help them grow sustainably and make farming, especially for families, more rewarding now and in the future."

Ian convinced agronomist Danny Conlan, who had returned to his family farm at Sea Lake, to help build a broadacre cropping advisory business. They created a dedicated agricultural division in 2002, hiring a team of tertiary-educated agronomists.

Ian said it took "a lot of work and great powers of persuasion", but by introducing new farming techniques, they helped change the Mallee from a dustbowl into a reliable, productive, winter cropping region in just 10 years – despite the decade-long Millennium drought.

Danny's role in reshaping the region's cropping systems was recognised when he was awarded the 2016 David Roget Excellence Award by Mallee Sustainable Farming.

The increasing complexity and scale of farming operations over the past 20 years has also brought greater demand for Dodgshun Medlin's other advisory services, which include integrated tax, accounting, financial planning, succession planning and off-farm investment.

Ian said it was like connecting the dots.

"The entire list doesn't apply to every farm, but we make sure we have the right specialists to do each part, and that they work as one team," he said. "There's no point in making what might be a good decision in isolation, if it's going to throw a spanner in the works."

Dodgshun Medlin has helped hundreds of farmers in Victoria, South Australia and New South Wales learn to see the bigger picture and manage risk, as well as challenging them to do some things differently.

"Rather than doing the same thing and hoping for the best, or hoping for a good year, we work with farmers to manage for the best result, regardless of seasonal conditions," Danny said. "It's great to see the Mallee in much healthier shape than it was 10 to 20 years ago. And now there's another generation coming through that is excited about farming, evolution and change."

For more information, go to **dodgshunmedlin.com.au**

> "Dodgshun Medlin offers a lot of services and we've taken advantage of most of them. You don't have to put your figures out to all these different companies; it can all be done under one roof. Most of the agronomists are working on their own farms, so you really value the information. It's unbiased, independent advice that you're getting."
>
> Manangatang grain growers Trevor & Dianne Walters

DODGSHUN MEDLIN
LAND BUSINESS LIFE

OPPOSITE PAGE:

TOP - Four generations of Manangatang growers: Dianne (from left), Trevor, Keith, Haydn, Abbie and Johnny Walters

LEFT - Haydn Walters and Dodgshun Medlin seasonal management advisor Matt Witney

RIGHT - Dodgshun Medlin farm improvement advisor Danny Conlan and analyst Joash Parker

Breaking up is not so hard to do

While the unmistakable yellow slash of canola is not easy to miss there was a time, not that long ago, when break crops were the rare exception in the Mallee which was then a land dominated by intensive cereal cropping.

That wall of resistance began to come down with the GRDC & SARDI funded low rainfall crop sequencing project and MSF ran side by side comparisons of around fifteen different break options as well as a continuous wheat plot.

Some of the break crop options included in the trial ranged from canola to peas, pasture, fallow and lupins.

The impact from that trial was identified by the Australian Bureau of Statistics who found that from around two percent of the Mallee being sown to break crops in 2011, now the figure is approaching seven percent.

Agronomist Michael Moodie says these trials conducted for MSF have given growers confidence in break crop's long-term profitability with several years of regionally specific data clearly demonstrating the benefits break crops offer as well as how any risks posed can be reduced.

He says when the trial began Mallee farmers were beginning to see the adverse impact of intensive cereal cropping over time, with decreasing productivity caused by crop diseases, grassy weeds and reducing soil nitrogen.

Michael says against that background, growers were keen to look for an alternative and this trial was able to give some reliable answers to the hard questions being asked about the viability and profitability offered by break crops.

The MSF trial indicated that following a one-year break with field peas, the subsequent wheat crop returned an increase of 0.3 tonnes per hectare and 0.1t/ha with a canola break. While these results only persisted for one year - a two-year break increased wheat yields by 0.5 to 1.25t/ha.

Michael Moodie says brome grass reduction played a significant part in that outcome, accounting for thirty nine percent yield increase on the trial in 2013 and eighty percent in 2014, along with increased nitrogen and less rhizoctonia.

He says break crops give growers more and different management options from different herbicides and even alternative end-uses such as brown manure or grazing.

Break crops continue to break out across the Mallee and these days growers have expanded their horizons to often include field peas, chickpeas, lentils, lupins and vetch for manuring, hay or livestock.

Break crops give growers more and different management options from different herbicides and even alternative end-uses such as brown manure or grazing.

Chris Davies, Michael Moodie & Mick Brady

Sandy Soils

A love/hate relationship?

There are a few facts of life that make up farming in the Mallee, it's hot, while rain might be bucketing down across the rest of the South East Australia the Mallee sticks to its low rainfall reputation and generally Mallee soils are sandy.

MSF has been heavily committed to researching sandy soils to investigate just how to best manage the Mallee's predominant soil type for profitability as well as appreciating that sandy soils really do underpin sustainable farming in the Mallee – especially now that no-till with stubble retention is standard practice.

A consistent finding from MSF research including the GRDC and CSIRO funded Reaping Rewards project and the more recent Stubble Initiative was that while the sands might not always be the most productive soil type, in a really good year provided the right nutrition they can offer impressive profit-risk results. Sandy soils particularly with adequate nitrogen can be very reliable and even though sandy soils don't hold a lot of water, what moisture they do retain they will very easily give up to the crop.

Water extraction is a key research focus for the latest MSF research in partnership with CSIRO and PIRSA is investigating the potential to change the ways in which a crop can access water out of those sandy soils.

This GRDC funded program of research is also looking at overcoming the physical restraints offered by sandy soils such as hard pans as well as improving fertility. While the jury is still about what the best method might be MSF is working with growers to test and develop a range of new generation machinery and nutrition options.

As a result of this work MSF farmers now have the highest uptake of variable rate and soil-specific management in Australia but there's always an eye on new opportunities for increasing production from sands.

For some farmers the frustration with sandy soils grows when they invest in feeding nutrients, but if the season does not break and there is no further rain, that expenditure is not returned as the roots are unable to follow what limited moisture there is down.

The emergence of seeps is also a concern for some growers, who are watching that valuable moisture leach out from the dune swale base.

One of the great farming truths is that you can only work with the resource base you have.

The MSF sandy soil research agenda is about managing that resource in the best way to start from the current potential yield and see how just much can be grown on the challenging, Mallee sandy soil.

Finding answers to the big questions like how do we actually build up the guts of the soil, increase nutrition and drive fertility to better our sandy soils?

And that is the challenge to go beyond having not just a really reliable soil, but a soil that can really capture the upside benefits that whole of farm production systems can offer.

Pulses in the Mallee's sandy soils

Agronomist Michael Moodie has spent most of the past decade researching and promoting break crops in the Mallee. All that work might be just the tip of the iceberg in exploring the untapped potential that remains in the range of crops and varieties available and what might come next.

He says research and adoption of break crops has occupied a unique space in Mallee farming systems and that success could be a springboard to encourage further blue-sky thinking about exactly what might be possible.

'Some real forward thinking might consider what other kind of crops we can grow along with improving what we have. Would genetically-modified crops offer something that markedly changes and raises the bar from where water use efficiency is now to where it could be in the future?'

Michael says the pace of change is only one remarkable aspect of the break crops in the Mallee story.

'Wheat has been bred in Australia for well over 100 years, whereas the lentil industry in Australia didn't start until the 1990s and chickpeas around the same time. Now we are starting to see a lentil and chickpea industry starting to form in the low rainfall Mallee.'

'Wheat has been bred in Australia for well over 100 years, whereas the lentil industry in Australia didn't start until the 1990s'

Mannum Pulse Check Group

Michael says twenty years ago in Australia the domestic market for lentils was very small, maybe you would see the odd lentil in grandma's soup, whereas now lentils have become part of the background and you are probably inadvertently consuming them everyday in trendy health foods.

He says that means there is a clear market signal breeders and those people and companies working on developing these varieties are going to be much more inclined to say well we should be breeding for these lower rainfall marginal areas as they become a bigger market because the Mallee is going to form an expanding market opportunity for growers to increase the yield potential and also the reliability.

'Obviously markets fluctuate a lot and we are dependent on traditional markets like the sub-continent with their insatiable demand for chick peas, but in the future every day Australians and the broader western society are changing their dietary habits. The Mallee is a great environment for growing pulses so we could start planning now how best to reap the benefits from those social shifts.'

Twenty years ago in Australia the domestic market for lentils was very small, maybe you would see the odd lentil in grandma's soup, whereas now lentils have become part of the background.

Winter vegetable soup

Homemade soup, made easy with McKenzie's products

Preparation time: 20 minutes | Cooking time: 30 minutes | Serves: 4-6

INGREDIENTS

¾ cup McKenzie's 12 Blend Soup Mix
1 tbs olive oil
1 onion, sliced
3-4 garlic cloves, finely chopped
80g smoked bacon, cut into batons (optional)
2 carrots, diced
1 celery stick, sliced
1 potato, diced
2 litres vegetable stock
1 zucchini, sliced
½ bunch kale, well rinsed and shredded
McKenzie's Sea Salt Grinder, to taste
McKenzie's Whole Black Peppercorn Grinder, to taste
Grated parmesan, for serving

METHOD

1 Prepare the 12 Blend Soup Mix according to on pack preparation instructions.

2 Heat the oil in a large pot and add onion and garlic, cooking until just tender. If using, add bacon and cook for 2-3 minutes.

3 Add carrot, celery and potato to pot and cook for 2 minutes. Add soup mix, stock and zucchini. Bring to the boil and reduce to a simmer for approx. 25 minutes or until mix is just tender.

4 Add kale and stir through until just wilting. Season well and serve with parmesan.

www.mckenziesfoods.com.au

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Soil CRC

Practical solutions for Mallee soils

Underperforming agricultural soils are costing Australian farmers billions of dollars in lost revenue each year. Mallee farmers know the importance of good soil management and are always looking for effective and practical tools to better manage their soils.

The Cooperative Research Centre for High Performance Soils (Soil CRC) has been established to provide farmers across Australia with the knowledge and tools they need to make complex and difficult management decisions about their soils.

The Soil CRC has 39 participant organisations whose members include 5,000 of Australia's leading farmers. Mallee Sustainable Farming is one of these 39 participants. In total, these organisations have committed $20 million cash and $104 million in-kind contributions, with a further $40 million from the Australian Government, providing funding for 10 years to the Soil CRC.

Chief Executive Officer of the Soil CRC, Dr Michael Crawford is excited about the opportunity the Soil CRC presents for Australian farmers.

"It's the biggest collaborative soil research effort in Australia's history. There are eight universities, three state government agencies, 19 farmer groups and a range of corporate and industry partners," he says.

"Our research is led and shaped by farmers. We are listening to what they want, and our research programs are designed to address the issues outlined by them, our participants," he says.

Dr Crawford believes the Soil CRC is uniquely placed to make a difference because of its collaboration across disciplines and between farmers, industry and science.

"We are not just about soil science. The Soil CRC is bringing together research across a range of disciplines including social science, economics, chemistry, biology, agronomy and soil science to find practical solutions to our underperforming soils," he says.

The CEO is both optimistic and realistic about the impact that the Soil CRC will have on Australian agriculture.

"While not being able to solve all of Australian's soil problems, we believe that over the next ten years the Soil CRC is going to have a significant effect on the productivity of our soils," he says.

Our practical, real-world outputs will allow farmers to optimise their productivity, yield and profitability, and ensure the long-term sustainability of their farming businesses.

As a participant of the Soil CRC, Mallee Sustainable Farming members can expect to see:

- More investment in soil productivity research and adoption

- Opportunities for accessing research and researchers from across Australia

- Opportunities for interacting with like-minded farmer groups from across Australia

- An opportunity to take a longer term perspective on soil productivity research.

For more information about the Soil CRC, visit **soilcrc.com.au** or email enquiries@soilcrc.com.au

Dr Michael Crawford

The Soil CRC is led by CEO Dr Michael Crawford who has over 25 years' experience in extension, research and science management in areas related to soil science, farming systems and natural resource management.

ADVERTISING FEATURE

Craig Bell & Peter Frahn

A Constant Over Time

The MSF journey began in 1997 and at the same time Craig Bell from a farming property at Nhill was working on a Science degree. He moved to the Walpeup Research Station for his first job in 1999, starting as a Pulse Technician until 2001, then as a Novel Farming Systems Technical Officer looking at wide row farming systems with Ben Jones. In 2002 Craig went on to become Operation and Production Manager at Walpeup in charge of a dozen staff and involved in managing MSF trials at Walpeup and surrounding areas.

Craig thinks back to the trial site visits and recalls lots of people coming to look at the sites. Field days would be full day events and farmers would come from a long way away. The days were such a showcase he even remembers roast lunch being served to a hoard of hungry farmers.

In 2004 Craig moved to SA to take on a role with SARDI in pastures research. His focus was to work on the commercialisation of Angel medic, a group B herbicide tolerant variety.

Funnily enough this would see Craig back in the MSF region and working with farmers in the Broomrape Quarantine zone. Craig also had pasture trials at Allen Buckley's core site and Karoonda.

As funding for pastures came to an end Craig moved to Rural Solutions SA and continued to work with farmers in the Broomrape area. Engaging with farmers living with quarantine restrictions was tough going but the best practice promoted by MSF – shifting to no-till, continuous cropping with cereals using higher inputs and improved weed management over summer were all strategies that would help prevent broomrape emergence and spread.

MSF research was making a difference to farmers across the tri-state Mallee region and it was no different for those living in the Broomrape Quarantine zone. Shifting the focus to production helped to engage many that felt disadvantaged by quarantine restrictions at the time.

The quarantine zone was lifted in 2013, leaving a legacy of improved weed management, better rotations and a greater presence of MSF.

In 2009 Craig took up an offer at Elders in Murray Bridge and is approaching 10 years as an Elders agronomist. He still works in the MSF region, with many of MSF's farmer members and is often involved with MSF activities and events.

Looking forward Craig can see value working with MSF to co-locate trials and events, and comments we need to work together as one organisation can't be everything to everyone. Craig says, "The demand on a farmer's time to attend events is so great and a collaborative approach can help maximise attendances and resources". And if all else fails Craig still attends MSF field days and events on behalf of his clients, "When they can't get there they ask me to go instead", he laughs.

Virtual Fencing

Back in the early days of farming in the Mallee, block sizes were much smaller than today and farms relied on a variety of income streams often mixing sheep, cropping and practically anything else that might turn a quid.

Over the years as farms have specialised into primarily cropping most of the historic stock fencing has been removed as paddock sizes have grown in the chase to access economies of scale.

While reducing obstacles and having large paddocks makes cropping operations more straightforward, it also limits opportunities to manage grazing pressure, especially in the Mallee's highly variable dune-swale landscape.

MSF has taken a leading role in partnering with CSIRO to examine the potential to use virtual fencing technology to enable spatial within-paddock grazing in mixed farming. Whole-farm economic analysis of the potential benefits of spatial grazing on Mallee farms shows why there is so much farmer enthusiasm for developing the technology for use in Mallee mixed farming.

Applying the same principles as the collar technology commercially developed for cattle, the virtual fencing trials have been testing if virtual fencing for sheep could allow areas of paddocks to effectively be 'fenced off' denying sheep access to grazing a restricted zone.

The first on-farm trials at Gol Gol in NSW tested whether sheep could be excluded from an erodible area of a small paddock by fitting the animals with a collar which emits an audio cue when the sheep ventures into the designated area.

The next challenge for virtual fencing researchers was to discover how many sheep in a mob would need to be wearing a collar to impact on the grazing behaviour of the entire group.

These trials were conducted in collaboration with MSF farmer Allen Buckley at Waikerie SA and results indicate the sheep demonstrated that grazing can be successfully managed using virtual fencing with the sheep quickly learning and adapting to the system.

There has been a lot of interest in the technology from Mallee farmers who can see some of the potential benefits including labour savings, targeted grazing for weed management and better managing pasture establishment.

Virtual fencing also offers the potential to effectively restrict stock from accessing areas which have lost groundcover and might be susceptible to erosion.

Just how far could this technology go? Once the technology is customised for use with sheep, such as in an ear tag, would it eventually allow remote mustering with a few clicks of the keyboard bringing the sheep in for shearing or marking?

The results from the Australian Government Department of Agriculture and Water Resources and CSIRO-funded research so far offer further encouragement for the ongoing pursuit of cost-effective virtual fencing technology for sheep.

While reducing obstacles and having large paddocks makes cropping operations more straightforward, it also limits opportunities to manage grazing pressure, especially in the Mallee's highly variable dune-swale landscape.

That sinking feeling

Mallee farmers reveal seeps impact

The Mallee Seeps Farmer Survey 2017 investigated the extent and impact of seeps on farm land across the Mallee in Victoria and South Australia.

Commissioned by Mallee Sustainable Farming this project is supported by the Natural Resources South Australian Murray-Darling Basin Management Board through funding from the Australian Government's National Landcare Program, Mallee Catchment Management Authority and the NRM levies.

The report's findings are based on a 15 question survey conducted in Oct-Nov 2017 asking Mallee farmers whose properties have had some impact from seeps. Questions included estimates of the areas of seep affected land, when they appeared, possible causes and the effectiveness of various management strategies implemented. It also asked how concerned farmers were about the issues, and reasons they may not have taken action to address the problems as yet.

The survey found seeps have become a significant problem for a large number of Mallee growers and confirmed that degradation caused by the fast growing emergence of high saline seeps could conservatively cost the region around $10 million in lost production per year.

Seeps occur in the Mallee landscape when rain water drains straight down through the sandy dune until it strikes the clay layer beneath. This recharge exits at the base of the dune creating a seep. While this area of higher soil moisture can provide some initial productivity increases, over time the seep will draw salinity and eventually render that part of the paddock economically unviable.

Survey Coordinator Chris McDonough says Mallee farmers reported seeps were getting worse over the last ten years with changes to farming systems including spraying out deep rooted summer weeds allowing more moisture to enter the dune the most likely cause. The MSF survey estimates seeps could already be directly affecting as many as 250 Mallee farmers.

'A few farmers have tried managing their seeps by planting some lucerne or

Seeps occur in the Mallee landscape when rain water drains straight down through the sandy dune until it strikes the clay layer beneath.

strategic tree planting, mostly to mixed success. The one consistent message revealed by the survey was the desperate need for extensive local applied research to find viable solutions.'

Mr McDonough says the report provides strong evidence that seeps are a rapidly growing land degradation problem and the majority of farmers who took part in the survey admitted they were unsure what to do next about managing and containing seeps.

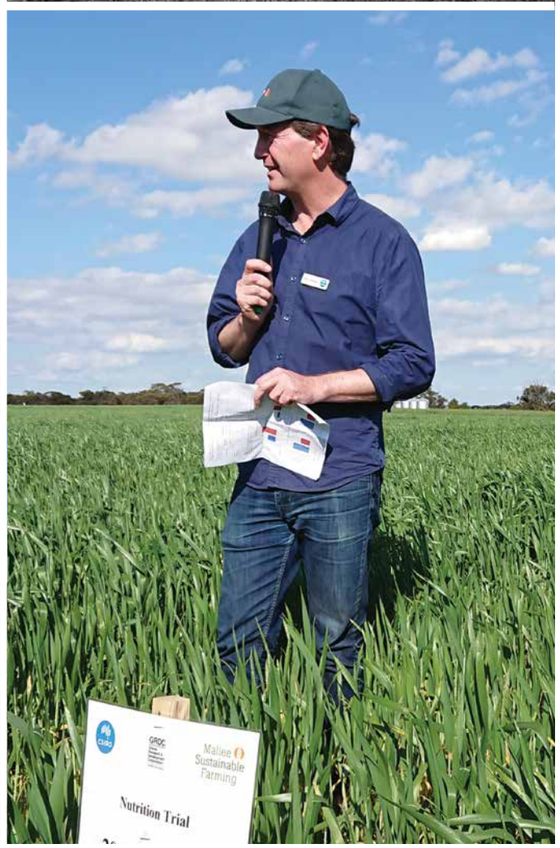
He says in terms of actual land currently affected, the Mallee Sustainable Farming survey revealed an average of 9ha per farm impacted by a seep for an estimated total across the Mallee of 2250ha.

Mr McDonough says based on the rapid emergence of seeps during the last ten years, left uncontrolled the area of seeps affected land in the Mallee could potentially grow to 20,000ha over the next decade. Losing that productive farm land, which might otherwise have yielded an average of 1.7t/ha @ $250/t along with the cost of lost grazing means an estimated loss to the Mallee of $10million/year.

The clear results from this study are that Mallee seeps are becoming a significant problem for a large number of Mallee farmers. The majority of seeps have become evident within the last 10 years and appear to be due to changes in farming systems coupled with very high rainfall periods. Farmers identify that poor water use on deep sands (impacted by effective chemical summer weed control) has led to new seeps appearing in both mid-slope and swale areas below these sandy rises.

A range of management strategies have been employed by farmers to varying degrees of success. However, nearly half of the farmers surveyed reported that they had not done anything to control the seeps on their properties. The majority said they needed more information to know what to do.

The one consistent message revealed by the survey was the desperate need for extensive local applied research to find viable solutions.



MSF Today

Farming in the Mallee has undergone significant change during the last twenty years, the most profound and perhaps the most noticeable has been the adoption of no-till and the intensive cropping farming systems that go with it.

Dust storms which were such a permanent part of Mallee life for so many years, these days exist only in the memory of Mildura families, who remember having to make a mad dash to the clothesline in advance of the dirt bearing clouds.

The precious top soil which was left bare and vulnerable by the practices of cultivation, now remains safely intact under a no-till farming system.

That achievement, that massive commitment by Mallee farmers to a sustainable future, owes much to the work of Mallee Sustainable Farming across the last two decades.

Conducting local research, demonstrating both the farming and financial case for no-till, bringing farmers and researchers together at field days, consistently making the case with engaging extension work.

Being proudly farmer led has enabled MSF to maintain a steady focus on the issues that matter to MSF members, while also being flexible enough to respond when situations change or when the skies turn dry.

During the long years of the Millennium drought, while Mallee Sustainable Farming's research efforts concentrated on how best to manage the extended dry, our focus also turned to what could be done to assist and support struggling Mallee farming families.

As part of the strengthening communities initiative MSF began holding well attended and popular community activities from guitar lessons to photography classes. Bringing people together and taking their minds of the ever present tough times – at least for just a little while.

Sustainability remains at the heart of MSF's agenda, building on our proud reputation for the value of our research, creative extension leading to practice change and adoption, the depth of our collaborative research partnerships, our active engagement with MSF members.

These days the question occupying Mallee Sustainable Farming leaders is not that much different from the challenge facing those who established the organisation, what decisions do we need to make now to ensure we can still be farming in another twenty years?

Michael Moodie

Farming the future

Pacing the change in the Mallee

For someone who has literally been digging up the secrets of successful cropping in the Mallee for the past decade, agronomist Michael Moodie has some interesting thoughts about the future of farming in the region.

Michael says the lesson of history shows us that traditionally agricultural research across Australia has led the change agenda and shaped new farming systems.

But that perspective tends to overlook the innovative nature of Mallee farmers who have consistently shown they have the desire, skills and equipment to try new ideas and techniques for themselves.

Michael believes one of MSF's great strengths has been in recognising the contribution of growers to innovation.

'It remains very important for MSF to continue as we have always done: working with leading farmers who want to investigate what else they can try.'

MSF assists by scientifically and rigorously validating their methods and their results, so they can see if they are on the right path or not.

'I think we are at a fork in the road moment. We have probably exhausted the low-hanging fruit, so we are going to have to be more creative, more innovative about the type of research and extension topics we focus on.'

One trend likely to continue into the future is looking for that next competitive edge.

'People are always going to be looking for new ways to do stuff, which will be vital as new technology comes along and completely changes the ball game.' So, what areas might research focus on in 20 years' time?

'I suspect that farming in the Mallee will be heavily dependent on the development and evolution of technology and what farmers have access to. There will be a lot more focus on identifying the weak links in farming systems, whether it be sandy soils or sub-soil amelioration. Probably, we will be actively considering not just the crops we can grow now, but which crops we can adopt as new genetic material becomes available.'

'I suspect that farming in the Mallee will be heavily dependent on the development and evolution of technology and what farmers have access to.'

Getting out on top

Avoiding tough times in the Mallee

Farming the Mallee is tough. The one common bond shared by every type of enterprise from wheat to almonds, citrus to sheep is that all Mallee farmers require experience, passion and the will to make hard decisions.

The Rural Financial Counselling Service Victoria – North West (RFCS Vic NW) knows about tough times in farming – RFCS Vic NW Executive Officer Pat Timmons says one of the learnings from the Millennium drought was that some Mallee farming families carrying financial stress could reasonably bypass years of worry and mental pain by making hard choices – such as selling up – at the right times.

‘Experience tells us that after a couple of good seasons, a return to dry conditions is usually what lies ahead. For those who’ve experienced consecutive good seasons and those still awaiting theirs, the opportunity is always there to consider all options. For some farming families who might now be in the best position they have been for quite a long while – their equity position is still fragile and a few dry seasons could make their farm business unviable.’

‘Making the decision to give up farming is one of the toughest choices many Mallee farming families will ever make. But facing that formidable question today, while you are on top, when land prices are good and there are more adjustment options available is much better than having the same conversation after several years of dry seasons or even drought, and thinking what could have been.’

Mr Timmons says from time to time clients of RFCS have exhausted all other avenues of keeping the farm viable and face exit - usually not on their terms.

‘We want to encourage Mallee farming families who may be in this category to have a good look at their options, all options. A first step would be having a discussion with everyone in the family who has a stake in the farm - from those currently relying on the farm to generate income, to the interests of the future generations who may or may not wish to take it on.’

Mr Timmons says everyone invited to that farming family conversation should consider – ‘where will we be in five years’ time?’

He says the RFCS is skilled in raising these sensitive issues. ‘We are used to having hard conversations, it’s a place no one wants to find themselves, which is why the RFCS is taking action to try and encourage some of these farming families to avoid the risks, pain and stress that can come with choosing to stick it out and possibly missing their best chance to leave farming on their own terms.’

www.sunrcs.com.au

Rural Financial Counselling Service
VICTORIA - NORTH WEST

Locals unlock Agribusiness at La Trobe

Demand for agribusiness professionals is growing, especially in the Mallee. With such a strong presence in the regions, it made perfect sense for La Trobe University to offer an Agribusiness degree. The course started at the Mildura Campus in 2016 and has offerings across all its regional campus network in Bendigo, Shepparton and Albury-Wodonga.

Josh Nolen is a Mallee boy and says Mildura is where he wanted to study Agribusiness.

"My family has a long connection with business and farming, it is something I have grown up surrounded by. I love the world of business and find it really interesting because it is always changing, there is always something new to learn. La Trobe's Mildura Campus is where I wanted to study because of all the different industries located within Sunraysia. I see Sunraysia as an absolutely amazing place to start my career, there is so much opportunity for local businesses to expand," Josh says.

Dr Deb Neal, Head of Campus at Mildura, says a key feature of the course is a series of subjects delivered at each regional campus. "In effect, the course takes you on a state-wide tour of regional Victoria's agribusiness industries and communities. While studying students get to meet, talk and gain work experience with local agribusiness and community leaders. Our course has also been endorsed by local industry. Mildura Fruit Company, Wakefield's Transport and Nangiloc-Colignan Farms have donated $75,000 towards scholarships for students studying Agribusiness at the Mildura Campus," Dr Neal says.

www.latrobe.edu.au

"I see Sunraysia as an absolutely amazing place to start my career, there is so much opportunity for local businesses to expand."

LA TROBE UNIVERSITY

TwentyOne

THE FIRST 21 YEARS OF MALLEE SUSTAINABLE FARMING

2018 marks twenty one years since the first collaboration between the GRDC, CSIRO and local Mallee farmers established what was originally known as the Mallee Sustainable Farming Project. Recognising the need to conduct Mallee specific research and extension, those early days were the first pages in what has become the proud history of Mallee Sustainable Farming. Still faithful to that original vision, today MSF exists to assist farmers adopt even more efficient and profitable farming systems in the low rainfall, sandy soil Mallee region across three states.

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MilduraLiving magazine
THE WORKSHOP CREATIVE
Mallee Sustainable Farming

TwentyOne is produced by The Workshop Creative and is a collaboration between Mildura Living magazine and Mallee Sustainable Farming. Mildura Living magazine showcases the best of Sunraysia from Wentworth to Robinvale and is published quarterly in line with the seasons. For more information please visit www.milduraliving.com.au

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