"What's been GOAing on?"

A review of Grain Orana Alliances' achievements of the last five year project

Maurie Street

CEO – Grain Orana Alliance

Key words

Grain Orana Alliance, GOA, Grower solutions project, research, on farm trials

GRDC code

GOA00001

Take home message

- GOA has brought to growers in the CW of NSW a terrific return on their levies invested in the project over the past 5 years
- GOA regularly engages with the local industry to identify research priorities to ensure the highest priority issues are being addressed
- GOA has proven its ability to tackle a wide range of research topics relevant to the local region in a timely and effective manner
- GOA has comfortably integrated itself in to the current research community and cemented its place in the region as a key research body and information provider
- GOA will continue to build on its success's with the signing of a new 5 year agreement with the GRDC taking the project through to 2020

Introduction

June 2015 saw the completion of GOA's sixth year of effective operation. In that time GOA has grown from an organisation with just one employee, armed with a mobile phone, laptop and a ute to a fully functioning research organisation with three full time permanent employees. In that time GOA has successfully run an ever expanding research program specifically tailored to the growers of the CW region of NSW and beyond tackling many of the key production constraints that they face every day.

This report presents a brief snapshot of many of the key projects GOA has undertaken and some of the key findings developed from GOA's activities.

What is GOA?

Grain Orana Alliance or GOA for short is for all intended, a purpose built entity- it is a non for profit incorporated association that was formed in 2009 specifically to undertake the then newly tendered GRDC project "GRDC- Grower Solutions for Central West NSW".

The GRDC Grower Solutions Project was developed specifically to provide a framework to-

- Regularly engage the local industry to understand and document what are the research priorities or knowledge gaps in the grain production industry

- From those issues raised- design and implement a research program to address some those issues but with an emphasis in addressing issues with a shorter research term (1-3 years) or those issues that required a rapid response
- Communicate all the issues raised in the consultation process to help guide the GRDC's investment strategies particularly in the mid to longer research terms (3-8 years, 8 years +)

Over the past 5 years GOA has had over 500 growers and advisors attend their regular meetings ensuring a good cross section of the industry is consulted to help GOA and the GRDC understand what are the major issues. This has also meant that the findings of GOA's research work is extended directly and indirectly to the regions growers. GOA focuses strongly on the utilisation of attending advisors and their ever growing influence on farm business' to extend and implement the prganisations' findings.

These meeting s also ensures GOA's trial program is concentrating on the key issues facing growers. GOA's trial program has grown steadily since 2009 to 2015 with the 2015 season consisting of over 2000 trial plots over 35 separate trials in more than 15 different locations across the GOA region.

Detailed below is a brief summary of some of the key achievements, findings and outcomes from GOA's activities over the past 5 years. As will be will be seen below there are a number of key research topics that have been undertaken by GOA that have led to changes in industry practice which has then flowed through the farming system which all resulted in increased profitability, reliability or sustainability.

Weed management

Windmill grass control

Since 2010 GOA has run over 30 trials investigating herbicide control options for windmill grass (WG). From this trial work it was shown that the use of a group A herbicide, in this case Targa®, followed by a double knock of paraquat was effective in controlling this problem weed. Other trials investigated a number of other aspects to the use of the strategy such as the effects of delayed application, optimising the time of the double knock and the potential fit of residual herbicides with this option.

GOA's trial work on WG possibly remains as the largest and most comprehensive body of work for herbicide control still to this date. Data generated from GOA's trials was central in the granting by the APVMA, of a minor use permit for the use of Targa/ double knock strategy that represents the only really effective herbicide control option for growers. Prior to the development and the issuing of this permit many growers had been forced to return to cultivation seen in many cases as the only effective control option of WG.

Fleabane

Since GOA's inception GOA has also had a strong focus on control of Fleabane (FB) having run over 25 trials investigating herbicide control options. GOA's trial work helped showed the need for a double knock of paraquat to control medium to large fleabane as single pass strategies were often completely in effective. GOA ran quite a number of trial investigating a wide range of herbicide spikes to control FB which showed 24D spikes to be the most consistent and reliable. GOA's trial work was some of the only work to investigate the relative effectiveness of the various 24D formulations as tank mix partners.

GOA also demonstrated through trial work the potential for paraquat mixed with various tank mix partners for single pass FB control. What was demonstrated was those mixes often rivalled or even surpassed what was achieved by the best double knock strategies. This would also give growers a useful alternate to glyphosate based knockdown strategies. This is seen as particularly useful in light of confirmation of resistance of FB to glyphosate in that same period.

GOA also undertook a number of trials investigating a number of pre- sowing herbicide spikes for seedling FB control- a situation that was often overlooked by many other research bodies.

GOA in collaboration with NSW DPI was also the first to demonstrate the value that Lontrel® (clopyralid) had as an in crop residual to prevent establishment of FB in crop that eventually lead to the registration of Lontrel Advance® with that very claim.

Herbicide resistance surveys

Whilst GOA has addressed some of the more acute weed issues, experienced by the regions growers in problems such as FB and WG, the organisation has also been conscious of the some of the larger, long term issues in the weeds space. Developing herbicide resistance particularly in our key winter weeds was seen as one of those.

Engagement with leading growers and advisors across the region continually raised the tendency of many "other" growers to dismiss herbicide resistance as not a local issue and as such they did not need to act. Many advisors highlighted the lack of good strong empirical evidence of resistance in the local region and many admitted they themselves were not sure of the true severity of the situation.

Ahead of the harvest of 2013 GOA initiated a program where growers or advisors could submit weeds samples of annual ryegrass (ARG) or wild oats (WO) for testing to a wide range of herbicide options. The response was immense within a day our projected intake of samples had been surpassed by nearly 4 times and as such submission of samples had to be shut down. Over 120 weed seed samples were submitted to the survey and the results were alarming. Of the ARG samples submitted, none were completely susceptible to the herbicide tested- 100% were resistant. The level of cross resistance was also alarming with 54% of samples showing resistance to four or more herbicide groups tested. The BO samples also showed alarming results.

This survey undeniably showed that resistance was present in the GOA region and in many cases it was severe. Following on from the results of the 2013 survey a second survey was initiated ahead of the 2014 harvest. The response to this survey (94 weed samples) was lower than the 2013 survey but the results were arguably much worse.

Samples submitted in 2014 showed high levels of resistance and cross resistance. Resistance to clethodim was present in 61% of populations and 57%of populations showed glyphosate resistance.

The running of the two surveys have undeniably shown resistance to be present in the region and detailed its severity. The evidence from these surveys serves as an immensely strong weapon to promote acknowledgement of the issue by growers and advisors in the region as the first step to

seriously addressing it. The level of cross resistance revealed puts serious challenges to the belief by many that there are other herbicides out there for me to use and that simple herbicide rotation is enough.

This data and the outcomes of the surveys give industry leaders and advisors a launch pad to talk about other options for weed management such as harvest weed seed management and alternate agronomic tools which are not herbicides which have previously been dismissed as not needed yet!

Annual Ryegrass Management

Driven by concerns raised by growers and advisors regarding increasing resistance in ARG to many of our post emergent herbicides and the increasing reliance on pre-emergent chemistries GOA initiated a series of trials over the past three seasons aimed to improve pre-emergent performance and growers confidence in their use. The need for this work was only enhanced by the results emerging from the Herbicide Resistance surveys discussed above- particularly with resistance to Clethodim obviously on the rise.

The trials broadly aimed at offering independent data on the performance of a range of chemistries available to growers over a range of crop types and locations. As would be expected the trial looked at the standard "off the shelf" per emergent herbicides including older ones such as trifluralin or atrazine but also newer options like Sakura®, Boxer Gold® or Rustler® (propyzamide). However it also trialled a number of tank mix combinations and the results of some of these mixes was nothing short of impressive.

As is common expectations the stand alone chemistries- even the newer generation in high populations in which they were trialled achieved only around 80% control at best with some "district practice" options achieving little more control than applying nothing at all. However across 3 seasons and more than 12 trials- often the tank mix options performed better than the individual components. The other clear finding was that in many cases growers could add extra products into their current or common district practice pre-emergent strategies and see substantial improvements in their efficacy against ARG.

In some of these trials, ARG populations of over 300 plants/m2 in the UTC control was reduced to less than 1 plant/m2 but only when multiple modes of action were applied and no single pass treatment achieved such levels of efficacy. A result that would have not often thought possible of pre-emergent herbicides.

If growers were to implement some of these findings into their systems significant reductions in ARG should result in less crop competition and improved yields, lower weed populations in crop option like clethodim will be applied to, lowering the chances for resistance selection and less seed set and seed bank replenishment.

Harvest Management of Canola

Windrow timing in canola

GOA initially investigated windrow timing in canola for its potential to influence of canola oil %. What was found, however over numerous trials over 3 years was that windrow timing had less influence over oil % as it could have on crop yields.

It was found that windrowing canola earlier than the current recommendations of 40-60% seed colour change, could negatively impact on yields by up to 30%. These impacts were shown to be the case even when timings were only a numbers of days too early as was often the district practice.

It was seen that district practice had drifted earlier than recommended timings most likely due to concerns over potential fears of yield loss through pod shattering with delaying windrowing. However the trial work undertaken by GOA showed that even with delays well past the

recommended timings, yield was not compromised and in a number of trials further yield gains were achieved where seasonal conditions were favourable.

Direct heading of canola

GOA also investigated the potential fit and performance of direct heading of canola over the past five years. Trial work by GOA showed yields when direct heading to be comparable to a well-timed windrowing but with cost savings up to $40/ha added to growers' bottom lines immediately.

Further trial work by GOA investigating the benefits of desiccants, pod sealants and yield impacts by delayed direct heading have all combined to increase grower confidence and understanding of direct heading and windrowing.

GOA, armed with the data from these trials has strongly advocated direct heading as an option for growers particularly in lower yielding environments and this has driven a strong adoption by many growers as there preferred harvesting option. It is estimated that less than 5% of the regions crop was previously direct headed at the beginning of GOA work in this space. By 2015 it is estimated that possibly more than 30% of the crop is now direct headed. Comments from a number of experienced growers sums up the situation well- "I have direct headed crops from 1t/ha up to 3 t/ha now and I don't think I will windrow again- it's just not needed."

GOA's work in the management of canola harvest has shown to have universal appeal and application across many growing environments. This is demonstrated by the requests for GOA to present on the topic on most likely more than 30 occasions including numerous GRDC Updates from Adelaide, Eyre Peninsula, Victoria and all areas of NSW.

Canola nutritional management

Sulfur

GOA has been investigating canola nutrition in the CW since 2010 and is still ongoing this year although the focus has changed over that time. This work was originally initiated with an aim to investigate if sulfur nutrition was influencing the low oil% achieved in the regions canola crops.

However after nearly 30 trials across the GOA region over the past six years, with all but a couple of sites predicted to responsive to the addition of S no positive response in yield or oil % has been measured to applied S.

These findings have put a serious challenge to long accepted recommendations that applying sulfur to each and every crop was essential to optimise production. Work by GOA also highlighted the very commonly misquoted S removal rates in grain, and the poorly calibrated soil test critical values often used.

Nitrogen

However what was also revealed was the responsiveness of canola to added N. In all but a few of nearly 30 canola nutrition trials that GOA has undertaken canola has shown a strong positive response to added N- nearly the polar opposite to the S story.

Trials in 2014 near Dubbo demonstrated an economic response to the addition of 200N to canola- achieving a yield increase of over 1T/ha. However this trial work has also demonstrated the potentially negative effect such high rates of N may have on oil %, but also the positive attribute of canola to resist "Haying Off" in response to high N applications even in moisture limited environments.

It would be incorrect to suggest that it was not well documented that canola had a high N requirement but the previous narrative for canola nutritional strategy was that S was non-negotiable in its requirement and that N could be more prescriptive in it use. However this work suggest that N should be more heavily focussed on and that the fertilising of canola with S based on confirmed

symptoms or other evidence of need rather than standard practice. That is if growers shifted their fertiliser expenditure on N instead of S they would almost universally increase their bottom line with return on investments high as 3:1.

Disease management

Yellow leaf spot

During the yellow leaf spot epidemics of 2010 and 2011 GOA undertook again over 10 trials aimed at fine tuning fungicide strategies for the control of this disease. What these trials revealed though was the fact that although fungicides had the ability to supress the YLS infection it was short lived and there was a very limited yield benefit. Trials showed that only where five fungicide application were made to YLS infected crops was there a positive yield benefit although it was barely enough to cover the fungicide costs.

Common application strategies of Z32 and Z39 timings were simply not effective in reducing the impact of the disease. These trials also demonstrated that the then common concern with seedling infection and the need to apply fungicides at that early stage were not justified with no yield advantage gained.

The trials demonstrated the source of the YLS infection is from the underlying infected stubbles which fungicides did not address, and any protective or prophylactic effect of fungicides was very short term. This allowed for re infection potentially at each rainfall event.

Trials run at the same time investigating pre-sowing / stubble management and the potential to impact YLS helped reinforce this view. In these trials burning or removal of infected stubble ahead of sowing resulted in significant reductions in the infection and improved yield performance. The burning treatments in these trials out yielded treatments in the adjacent trials even where they had received 5 fungicide application.

This work suggests that expenditure on fungicide application for YLS is not effective and better strategies that address the source of the infection, the stubble, are most likely much more effective.

Stripe Rust

Trials investigating the management of stripe rust in the central west was able to demonstrate core recommendations developed from other authorities locally in the GOA region. This gave growers and advisors confidence that outcomes from trials that were at that time in different climatic regions to the local region would still be effective.

GOA also investigated the management of stripe rust in dual purpose wheat as this crop was seen as a major source of inoculum in the region. Previous recommendations supported the use of Jockey ® fungicide on the seed and grazing to reduce disease incidence. GOA's work showed however that Jockey or grazing of the crop did not delay or reduce the infection or yield penalty associated.

Besides trial work

GOA value however has been shown to extend beyond just undertaking trial and research work. GOA has been a strong advocate for a number of key issues and principles as well as acting as voice for the CW of NSW.

For example GOA is well known for its advocacy for herbicide resistance management particularly with techniques such as narrow windrow burning. As little as 4 years ago only 1 or two growers in the region practiced the technique. Since then the growers adopting the technique has increased steadily in a large part through GOA promotion of the technique. GOA's chief executive officer is well known publicly through the topic with numerous Podcast interviews, YouTube videos, GRDC Updates and other industry forums.

The list above is not aimed at being a completely exhaustive list of GOA trials over the past 5 years but details many of the larger projects or those with the largest potential to increase growers' profitability or sustainability.

Certainly GOA undertook quite a number of other trials investigating issues perhaps described as more specific to the region or the season. Some of these found answers and outcomes adopted quickly. Some did not reveal any change or development in our current understanding which may not have alleviated the problem but may avoid unnecessary or ineffective attempts to manage them.

In either case these sorts of investigation or trials are a terrific example of what GOA and other Grower Solutions groups have been designed to address-local issues raised that need a quick response. Issues that may not otherwise not be worthy of larger investment or capture the attention of existing research bodies.

Central to process of identifying such problems is the Local Research Updates (LRU) that GOA runs twice a year. The LRU are an opportunity for growers and advisors to put forward issues that are challenging their production systems and these meeting are open to anybody to attend. Details of when and where these meetings are available on the GOA website at www.grainorana.com.au

Where you can also subscribe to our mail list to ensure you will be kept informed via email.

® Registered trademark

Acknowledgements

The research undertaken by GOA is only made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the author would like to thank them for their continued support.

Contact details

Maurie Street
Grain Orana Alliance
Po Box 2880

Dubbo NSW 2830
Ph: 0400 066 201
Email: maurie.street@grainorana.com.au