LIEBE GROUP NEWS

April 2019
Volume 22
Issue 3

What's Inside

LIEBE GROUP
Working together in Agriculture

From the Cover

Seeding preparation is well underway for the Liebe region. Nicky Brennan's entry for the 2018 Seeding Photo Competition.

DIAMOND PARTNERS

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CSBP

CBH GROUP

RSM

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FROM THE EXECUTIVE OFFICER

Bec McGregor

WELCOME to the April Liebe Group Newsletter. With many starting to think about starting seeding it is a great chance to touch base on what has happened in the last month and what we have planned for the remainder of the year.

It has been a busy month which has seen lots of activity in the Liebe Group building including a Partners in Grain paperless farm office workshop, a Farm Safety Workshop and our third AgChats session held last week on barley agronomy. We hope that members have enjoyed the range of opportunities we have been able to facilitate and host in our fantastic facility.

We are also pleased to welcome a new Silver partner to the Liebe Group in Boekemans Machinery Dalwallinu. We look forward to working with Boekemans and their local team.

With planning for our upcoming trial program well underway we are excited to share with you all the trials that will be on display at this year's Main Trial Site in Watheroo, as well as the vast array of trial activities spread throughout the Liebe Group region. Alana has been busy working with our research partners to establish a wide range of trials for Liebe Group members. A collated list of all of the trials that will be hosted in the Liebe Group region can be found on page 4.

The Women's Field Day agenda is close to being finalised with great range of presentations covering a number of relevant topics. We have been fortunate to secure Dr Lyn Beazley as a key note speaker for the event. Lyn has presented at past Liebe Group Women's Field Day's and is well renowned for her captivating and inspiring presentations. The event, which is to be held on Thursday 20th June, is one of the highlights of the Liebe event calendar so please share with your friends and family to spread the word.

Our AgChats series will kick off again after seeding so we encourage you to think about ideas for what you would like to see as part of this program for the remainder of the year. If you have any ideas please contact the office.

We will not have a newsletter for May so until June, happy seeding!

GOLD PARTNERS

Elders SCHOLZ RURAL

FARMANCO

IMTRADE AUSTRALIA Agriculture Reimagined

BAYER

SoilTech

SILVER PARTNERS

Syngenta
Pacer Legal
Agrimaster
Adama Australia
GrainGrowers
Landmark
Advanta Seeds
Australian Grain Technologies
Scott's Watheroo Dolomite
Refuel Australia
Tek Ag
NuFarm
Intergrain
Boekemans Machinery Dalwallinu

MAIN TRIAL SITE UPDATE 2019

RESEARCH, development and extension (R, D & E) has become an integral part of industry growth across the agricultural sector. With growers seeking that production edge, grower groups such as the Liebe Group lead the way in delivering local trials and demonstrations that increase awareness of improved farm management practices. The dedication to R, D & E across the Liebe Group region, sees almost 40 trials being coordinated and implemented across an area from Carnamah to Beacon in the 2019 season.

In collaboration with research partners, the Liebe Group will establish 17 trials and demonstrations at the 2019 Main Trial Site at Watheroo. Hosted by the Keamy family, the Main Trial Site will be home to National Variety Trials (NVT's) in wheat and barley, a canola variety trial, pre and post emergent herbicide trials in cereals, legumes and canola, herbicide resistance screening, seeding and cultivation demonstrations and much more.

Main Trial Site host Alex Keamy with son Ollie.

The 2019 season will see six established project sites continue to be monitored, while six new sites will cover a variety of work including; three grower scale demonstrations of agronomy packages for pulse crops. These new sites will be located at Dalwallinu and Beacon. Ian and Ainsley Hyde will be taking on a second legume site investigating herbicide options for chickpeas, while Harry and Jane Hyde will host a fungicide options in field peas demonstration. Beacon members Chris and Michelle Kirby are excited to also be hosting a legume demonstration site investigating herbicide options for chickpeas. The GRDC investment investigating the benefits of foliar micronutrients on cereals will see three trials be implemented across the low rainfall zone at the Hirsch family property in Latham, McNeill's in Dalwallinu and Cuthbertson's at Kalannie.

Furthermore, the Liebe Group continue to strengthen industry partnerships by assisting researchers from DPIRD and CSIRO select appropriate sites for their projects. This will see the Dalwallinu and surrounding regions exposed to work such as the chickpea NVT, agronomy packages for chickpeas and lentils being run by Mark Seymour and the pulse agronomy team at DPIRD, and the continuation of GRDC's investment in the subsoil constraints program, led by David Hall (DPIRD).

With the support of Liebe Group partner Landmark, and Australian seed company Seednet, a three year demonstration of the summer active perennial pasture species Lanza Tedera, at the Fitzsimon's property in Buntine, will provide growers an opportunity to explore its benefits for livestock production, nitrogen fixation and its contribution to the sustainable management of soils at high risk of erosion.

With an extensive amount of research being undertaken across the Liebe Group region, this has given rise to a number of satellite sites. Research hubs at Watheroo, Dalwallinu and Kalannie, will provide many growers from across these regions access to the latest research and agronomy, connecting them with industry partners who provide information to help improve farm practices for the future.

Field walks, discussion groups and the annual Spring Field Day will bring the research from across the regions to life. The large research program is a testament to the dedication of the industry to finding solutions for WA growers and all are welcome to see this work at the Spring Field Day, Thursday 12th September.

Trials at the Main Trial Site, Watheroo

Partner	Trial Name	Description
GRDC	National Variety Trials	Wheat
GRDC	National Variety Trials	Barley
Adama	Pre-emergent grass control in Lupins	Efficacy of pre-emergent options for grass control in lupins with and without SE 14
Adama	Fungicide options for Barley	Fungicide spray strategies in barley for control of net blotch (season dependent)
BASF and Landmark	Post emergent radish control options	Radish control including demonstration of Frequency as a broadleaf control option
Landmark	FCI herbicide resistance screening	Resistance screening of broadleaf control herbicides at three label rates
CSBP	Nitrogen management and timing in wheat	Nitrogen management and timing in wheat
Bayer	Glyphosate crop safety on TruFlex V RR canola	Demonstration of application rates and spray timings on crop safety in TruFlex and Roundup Ready canola varieties.
Imtrade	Pre-emergent control in Canola	Pre-emergent herbicide options in TT canola
NuFarm	Post emergent ryegrass control in Lupins	Efficacy of herbicide options, Clethodim and Factor for the control of ryegrass in lupins.
Elders and Syngenta	Demonstration of Calisto	Demonstration of Group H pre-emergent broadleaf control option, Calisto, for cereals
Liebe Group with: - Advanta - BASF - Pioneer - NuSeed	Canola Variety Trial	Demonstration of profitability of TT, RR and Truflex varieties suitable for the Watheroo growing region.
AHRI	Canola competitiveness against annual ryegrass	Impact of seeding rate x row spacing on control of annual ryegrass
AHRI	Canola competitiveness against annual ryegrass	Impact of seeding rate and seed size on control of annual ryegrass in canola
AHRI	Wheat time of sowing 1	Degradation of pre-emergent herbicides
AHRI	Wheat time of sowing 2	Degradation of pre-emergent herbicides
Liebe Group Members	Cultivation Demonstration	Bender V agro plough V Grizzly offsets
Bayer and Pacific Seeds	Impact of imidazalone residues on canola establishment	Canola variety imidazalone tolerance screening

LIEBE GROUP EMPLOYMENT OPPORTUNITY

Position: Research and Development Coordinator

ABOUT THE LIEBE GROUP

The Liebe Group is a dynamic, grower-driven, not for profit organisation that operates within the Dalwallinu, Coorow, Perenjori and Wongan-Ballidu Shires in the West Australian Wheatbelt. The group has built a solid reputation over the last twenty-two years as being on the forefront of locally relevant research, development and extension, having a high status of reliability and professionalism.

The group conducts valuable research, development and extension through trials, demonstrations and workshops, and provides information to local farming businesses in the region.

The core functions of the Liebe Group are:

1. Agricultural research, development, implementation and validation.
2. Provide information, education, skills and training opportunities to members and wider community.
3. Strengthen communication between growers and industry and whole community.

We are seeking a highly motivated and enthusiastic person to coordinate research and development in the Liebe Group area.

THE POSITION:

This is a full time, permanent position managed by the Executive Officer, assisted by the staff team and guided by active grower members. You will be required to be involved in diverse activities including:

- Understand and prioritise local grower agronomic, environmental and business management issues through diverse interaction with growers.
- Coordinate and manage the Liebe Group Main Trial Site, grower demonstrations and project sites.
- Conduct in-season monitoring, evaluation and analysis of trial and demonstration sites including plant and weed counts, disease identification and crop health monitoring.
- Build and maintain strong relationships with growers and industry stakeholders.
- Deliver a research, development and extension program which addresses local on-farm issues including the coordination of annual events
- Coordinate the production of Liebe Group's R&D Book including writing scientific trial reports

ESSENTIAL CRITERIA:

- Degree in Agronomy, Plant or Soil Science or related fields from an accredited university or experience equivalent
- General knowledge of Australian broad acre farming systems, products and technologies.
- Knowledge of or experience in scientific methods and analytical procedures appropriate to agricultural research.
- Knowledge and experience in research trial management including trial monitoring and experience in writing scientific reports.
- Highly developed organisational skills and demonstrated ability to set priorities and to meet deadlines.
- Ability to work independently, be self- motivated, show initiative and work productively as part of a team.
- Current C Class Driver's license
- The ability to live and work in Australia

THIS ROLE WILL PROVIDE THE SUCCESSFUL APPLICANT WITH:

- An extensive network within the agricultural industry
- A variety of independent work with an enthusiastic group of innovative farmers
- The opportunity to work in a brand new and modern research facility
- Mentoring and professional development opportunities
- A vehicle and mobile phone for work purposes will be provided.

SALARY: Salary package to be negotiated.
LOCATION: The Liebe Group Office is located in Dalwallinu, 260km north of Perth.

FOR FURTHER INFORMATION & APPLICATION FORMS:
Contact Rebecca McGregor, (08) 9661 1907 or email eo@liebegroup.org.au

APPLICATIONS CLOSE 5PM MONDAY 6TH MAY.

LIEBE GROUP EMPLOYMENT OPPORTUNITY

Casual Contract - R&D Field Assistant

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3. Strengthen communication between growers and industry and whole community.

We are seeking a highly motivated and enthusiastic person to assist with the monitoring and assessment of research and development trials in the Liebe Group area.

ABOUT THE ROLE:

The role will assist in the coordination, monitoring and assessment of the Liebe Group's trial and demonstration program throughout the region. Responsibilities will include in-season monitoring and assessments and may include travel to sites in the Dalwallinu, Beacon, Watheroo, Kalannie and Carnamah regions. This opportunity is for a casual contract role which is managed by the Liebe Group Executive Officer.

KEY DUTIES:

- Assistance with in-paddock crop establishment and weed germination counts
- In-season monitoring of crop health and prevalence of disease, pests and weeds
- In-season plant and weed assessments
- Data entry and input into developed trial data sheets
- Communication and identification of any issues as identified in paddock

ESSENTIAL CRITERIA:

- The evidence and willingness to work independently in field and in a team situation
- Ability to follow protocols and guidelines
- Good interpersonal and organisational skills
- The ability to communicate effectively both verbally and through written communication
- C Class driver's license

It is also preferred that the candidate possesses the following skills and experience:

- Experience in agriculture and in particular broad acre research and development trials
- Knowledge and understanding of field plot design and trial experimental procedure
- Ability to identify crop diseases, pests and weeds

BENEFITS

Negotiated contract agreement based on experience. The job has flexible hours and provides all equipment necessary to the role

TIMEFRAME: Up to 20 hours per week.

LOCATION: The Liebe Group Office is located in Dalwallinu, 260km north of Perth.

FOR FURTHER INFORMATION & APPLICATION FORMS:

Contact Rebecca McGregor, (08) 9661 1907 or email eo@liebegroup.org.au

APPLICATIONS CLOSE 5PM MONDAY 6TH MAY.

REGIONAL ROUND UP

THIS year, the Liebe Group will catch up with a family from within the Liebe region to find out what their plans are for the year and what they hope to achieve.

Note: Views stated in the Regional Round Up articles are strictly those of the individual and do not necessarily represent those of the Liebe Group.

Farmers (family): Chris and Michelle Kirby

Location: 23km North West of Beacon

Average rainfall: Annual: 300mm **GSR:** 195mm

Farm size: Total: 6000h

Area cropped: 4000ha: 60% wheat, 35% barley, 0-10% canola

Enterprise mix: 66% cropping, 34% sheep and fallow

Tell us about your business. What is the enterprise mix, who is involved?
We are a family farm business with a mixed enterprise of cropping and sheep. We have just recently expanded and taken over the original Kirby farm property which has increased our total farm size to 6000ha. We mainly grow wheat and barley with opportunistic canola and last year a few Jurien Lupins, which we were happy with. We are likely to grow them again if the season permits.

This year we will be running sheep on 50% of the pasture country and organising soil ameliorates and weeds on the other half.

In one word, describe the 2018 season?
Phenomenal.

Chris and Michelle loving the rain during seeding 2018

What were the main challenges and highlights from last season?
The main challenge for us in 2018 was managing the season effectively. The swings in the weather meant things didn't happen as staged as we would have liked. The background fertility that was carried over from 2017 we believed helped carry 2018 through.

Over the years we have had reasonably good control of weeds however in 2018 weed control wasn't as we would have liked. We had good radish control but the grasses were difficult to manage. We will be focused on driving seedbank numbers back down in those areas.

Looking forward to the 2019 season, what are your plans and goals?
Steady steady. Our approach will be to try and capitalise on the great financial result from 2018 so manage this season as well as possible to maximise the result at the end of the year. Our focus this year is on working with the lay country so when it comes back into the rotation it will be set up well for 2020.

Will you be making any changes to your rotations and enterprise-mix?
We have considerably increased our arable area due to the recent farm purchase and will be running a few more sheep and managed fallow area this season. Some areas with soil ameliorates applied haven't been incorporated for a while so with more area it will be possible this year.

Are you looking to trial or adopt any new practices or technologies this year?
We will be working with the Liebe Group this year to establish a new agronomy demonstration with chickpeas. We grew chickpeas a long time ago but had issues with weeds and diseases so are looking forward to seeing how they go in the trial this season.

What tools do you use to monitor the weather?
We don't use anything specific but use a range of websites and will generally take an average from them all to see what we think might happen. In terms of decision making for nitrogen application and dry sowing we just have to take a bit of a punt and once the rain has fallen we then know what we are dealing with. Past experience with different seasons also helps.

How much rain have you had this year? How is this influencing your decision making and what tools do you use inform those decisions?
With 4.5mm for the year so far, we will be sowing 50% of our program dry and see how the season goes. It is likely that canola will now go out of the program and we'll target our more reliable paddocks. Like all farmers it's about taking calculated risks on the basis of experience and information obtained from many and varied sources, including grower groups, consultants etc as to the likely outcomes of a particular circumstance.

What opportunities do you see in agriculture?
We believe that population growth and increasing affluence around the world is underpinning agriculture fairly well so are reasonably optimistic for the future of the industry.

We also feel that new technology in agriculture is going to revolutionise the way we do things in quite a short timeframe. Farming is currently hitting a bit of a wall with the practices we have been using for a while so the adoption of new technology is probably the next big influencer in agriculture.

We have also noticed that the social aspect of what we do in farming is so much more in the spotlight now. The way we are going about our business in agriculture is certainly going to be forced in a way that's seen as more acceptable than it's ever been.

What do you do outside of farming?
We are very involved in the local Beacon community. We really enjoy spending time with family and friends and have been fortunate enough to do a reasonable amount of travelling - recently enjoying a trip to Chile and Argentina. Visiting the different cultures of the world certainly opens your eyes to both the similarities and differences between us all. It makes you realise it doesn't get much better than where we live and gives you a burning desire to appreciate what you have got and make the most of it.

We also enjoy the social aspects of being involved with the Liebe & other groups as much as the fact that the innovation, ground truthing and productivity improvements we gain, help keep our business moving forward. We are very supportive of what the Liebe Group does and believe it adds to the business.

Chris and Michelle overlooking Bariloche in Argentina

FARM SAFETY WAS NO JOKE THIS APRIL FOOL'S DAY

Rebecca McGregor
Executive Officer
Liebe Group

ON Monday 1st April the Liebe Group held a Farm Safety Workshop with support from SafeFarms WA and the Muresk Institute. The workshop saw 18 Liebe Group members come together to discuss the requirements around safety for farming businesses and the importance of compliance.

Tracy McAlpine, Elserae Farm started off the day sharing her experience with farm safety and examples from their own business. Tracy explained the importance of inductions for not just staff but also family members and visitors to the farm to ensure a safe working and living environment. In addition to inductions on their farm, Elserae Farms have adopted a number of farm safety procedures including weekly farm safety meetings, seatbelts always rule, reflectors on power poles and fire management plans, to name a few. Tracy shared some examples of where hazards had been identified in their safety meetings and how they went about addressing these to ensure the safety of their staff and family members.

Maree Gooch, Project Director at SafeFarms WA spoke about the legalities of farm safety including changes to legislation and the potential penalties for both employees and employers. Maree explained that it is essential to "just get started in working towards compliance". Maree noted that a good place to start would be to identify the high risk tasks and start there by implementing procedures that will ensure the task can be completed in both a safe and effective manner. Maree then led the group through an interactive session with key elements of the SafeFarms WA Farm Safety Manual being discussed.

Jennifer Birch of Catalina Farms also gave some insights into safety for their farm business. Jen shared with the group how she and her husband Daniel have taken what they have learnt from the mining industry to develop a Safety Management System (SMS) for their business. Jen explained that an SMS is designed to manage all safety elements in the workplace and is typically made up of a whole farm risk assessment, employee on-boarding, task procedures, safety meetings, equipment maintenance, incident investigation and on-going compliance. "First and foremost the system is for keeping employees safe and training them in the right way to do things and secondly it's to cover the legalities" Jen noted.

The general message from the workshop from all presenters was that although the implementation of farm safety procedures can seem overwhelming it is best to just get started sooner rather than later and to use the available resources to you such as those found on the SafeFarms WA website.

Maree Gooch sharing key elements of the SafeFarms WA Farm Safety Manual.

BARLEY A HOT TOPIC AT THE APRIL AGCHATS

Alana Hartley
Research & Development Coordinator
Liebe Group

TWELVE growers and industry partners came together on Thursday 4th April, with a toasty in hand, to discuss barley in the farming system. Growers throughout WA are facing increasing pressure both on and off farm for sustainable management of their barley crops. With limited variety specific segregations at delivery points and the agronomic challenges for their crop rotations where herbicide tolerant varieties are grown, growers are seeking to improve the way their barley crop fits within their cropping program, both agronomically and logistically.

To shed some light on a topic, Farmanco agronomist David Cameron, and private agronomy consultant Michael Lamond, guided the group through various topics;

- Herbicide strategies and rotations for imidazalone (imi) tolerant barley varieties,
- The use of prosulfocarb and the efficacy of other pre-emergent herbicides,
- Sampling requirements from bulk handlers and exporters in light of glyphosate and imi residue testing,
- Variety selection,
- Net blotch resistance and testing, and
- The trade risks that loom as a result of China's concern for barley dumping.

The agronomic and logistical challenges that are a result of glyphosate and imi herbicides being applied to barley was the launching pad of the morning's discussion. This was a particularly important topic considering importers of Australian grain are now placing tighter restrictions on herbicide residue levels, particularly glyphosate. Glyphosate has only been registered in recent years to be used as a last resort crop topping weed management option, which has some importers of Australian grain concerned that glyphosate residues may carry over in the processing of grain for human consumption.

In response to this, local bulk handler CBH conducts auditing of barley samples for quality and chemical residues as the grain is delivered. As a result, growers are now required to declare whether they have applied glyphosate to their barley crop prior to delivery and a separate glyphosate declared stack is created. The discussion also highlighted the concern raised by importers about the more persistent group B imi chemistries that are being applied to varieties such as Scope and Spartacus, where the same auditing and declaration rules may apply in the future.

This was a good segway into the logistical management of barley crops being grown across the Liebe Group region. Agronomically, growers look to choose the best performing variety for their farming system however, the choice in variety does not always marry well with the preferences of the buyers of grain.

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So, how do we get the balance right between what our markets want and what growers prefer based on the agronomics for their farming system? The answer lies in the number of hectares sown. Providing bulk handling partners with crop estimates allows them to negotiate with overseas markets to sell grain in the upcoming harvest. If the hectares grown to a specific variety validates the need for a delivery point, this will be identified early in the season and the appropriate strategies can be implemented to make the delivery process as smooth as possible come harvest.

Staying abreast with the latest breeding lines emerging on the market and communicating this with both growers and buyers is integral to ensuring that all are not missing out on the benefits of growing barley. This has been particularly the case for imi tolerant varieties such as Spartacus, which has seen rapid uptake across WA due to the ability to apply Intervix for the control of Brome and other hard to kill weeds. As the discussion evolved, it was clear that while Spartacus was the variety of choice for growers and buyers, the looming concerns over herbicide declaration and residue testing leaves a sense of uncertainty about how varieties will be segregated during the 2019-2020 harvest.

The Liebe Group would like to thank David and Michael for assisting with the April AgChats session and for the Liebe members who were involved in the discussion. The Liebe Group will take a short break from the AgChat series over seeding and will regroup in July for the next session. Thank you to GrainGrowers for their continued support of the Liebe Group AgChats.

• SAVE THE DATE •

The Liebe Group Women's Field Day

THURSDAY 20TH JUNE 2019

DALWALLINU

Please mark your calendars for the annual Liebe Group Womens Field Day. Further information to follow.

Special guests:

Professor Lyn Beazley
University of Western Australia

Rosemary Bartle
Rabobank Australia

LIEBE GROUP
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POST SEEDING FIELD WALK

Wednesday 24th July | Members Only

LIEBE GROUP
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SAVE THE DATE

The Liebe Group invites you to participate in this season's Post Seeding Field Walk

Tour the Liebe Group Main Trial Site at Watheroo and view the many trials and demonstrations for 2019.

The day will conclude with a R&D brainstorming session, followed by dinner and drinks.

Please contact the Liebe Office on 9661 1907 or email admin@liebegroup.org.au with any enquiries.

MALTING BARLEY – A CUSTOMER PERSPECTIVE

Drew Robertson
Senior Barley Trader
CBH Group

IN summary:

- Bass and La Trobe are preferred customer varieties. La Trobe is critical for supply to the Japanese Shochu market.
- Flinders and Scope CL are widely accepted. Market evaluation is ongoing for Spartacus CL with more detailed user feedback expected mid to late 2019.
- RGT Planet (accredited in 2019) is still undergoing market evaluation for acceptance with commercial and brewing trials, which will dictate any premium available. Malting barley accreditation does not guarantee a malting premium.

As Australia' largest grain exporter, each year we like to provide an update from the perspective of markets and end-users of Australian malting barley varieties.

As growers are acutely aware, the recent market environment has been challenging – strong demand and high prices from Eastern Australia due to drought has been countered by weaker demand globally with high prices and ongoing challenges and uncertainty in the broader trading environment.

While this makes it difficult to interpret longer term signals in the market, as a general consideration, growing established and preferred malting varieties provides the best chance of attracting and maintaining a premium over feed when the market is oversupplied.

In recent years, end-users of Australian malting barley have expressed their concerns to the industry about the rapid change of varieties and the issues this causes.

Brewers need to produce a consistent product that meets all their key characteristics and it takes time and repetition to ensure a new variety will be able to meet requirements. The turnover of varieties can be a cause of frustration for customers and in the long term, Australian malting barley runs the risk of becoming substitutable with other origins.

For example, this year has seen the accreditation of RGT Planet, and there are six new varieties targeting accreditation in 2020 and 2021.

With the rapid adoption of Spartacus CL and RGT Planet by growers, and the decline of older varieties such as Baudin and Scope CL, it is vitally important that industry transitions away from older declining varieties to allow for effective rationalisation of segregations across the supply chain, creating efficiencies for all participants.

The full market update by variety is available at www.cbh.com.au and we recommend that growers read this information in conjunction with the Grain Industry Association of WA (GIWA) Barley Rationalisation Recommendations and the Department of Primary Industries and Regional Development (DPIRD) Barley Variety Sowing Guide for Western Australia to assist in any future decision making.

Table 1: Customer acceptance of Australian malting barley

PREFERRED:	Bass and La Trobe	These are the first choice for buyers and more likely to attract a premium over other accredited varieties. La Trobe is the only fully accepted variety for the Japanese Shochu market.
ACCEPTABLE:	Flinders, Scope CL & Spartacus CL	These varieties are accepted by the market as an alternative to a preferred variety. Demand for Scope CL is in decline and Spartacus CL continues to grow.
ACCREDITED IN 2019:	RGT Planet	This variety has achieved malting accreditation but is still undergoing market evaluation with commercial and brewing trials.
UNDER EVALUATION:	Banks, Maltstar, IGB1705T & Buff	These varieties are undergoing accreditation with Barley Australia. Banks did not pass through stage two accreditation. IGB1705T and Buff are in stage one with target accreditation of March 2021, Maltstar in 2022.

MORE THAN A DECADE ON, GRADUATES STILL REAP BENEFITS FROM FARM BUSINESS MANAGEMENT PROGRAM

Skye Ward
Media Relations Manager
Rabobank

MORE than a decade on, farmers who have graduated from one of agriculture's premier education programs, the Rabobank Executive Development Program, continue to reap the benefits from implementing long-lasting changes to the management of their farming business.

Tailored for progressive farmers to develop and enhance their business management skills, more than 600 farmers from across Australia and New Zealand have graduated from the Executive Development Program since it was launched in 1999.

With 2019 applications now open, Rabobank is calling for other forward-thinking farmers to join their ranks by applying for this year's program.

Run over two one-week residential modules – held over consecutive years – the Executive Development Program covers all major aspects of business management including strategic business planning, negotiation, financial management, risk management, communication and innovation.

Anita Dickins from "Waroonga" south-west of Dalwallinu first heard about the Executive Development Program through Rabobank's connection with the Liebe group.

"At the time, I was quite active with the Liebe women's committee and Rabobank's Crawford Taylor recommended I look into the program and have a go," Anita said.

Attending the program in 2005 and 2006, Anita said she had been "seeking some external information and perspectives around surviving succession planning" as well as managing seasonal variability and the realities of marketing.

"When I attended the program our business was evolving through a period of change," she said. "We had taken over the business three years prior alongside a few concurrent years of significantly variable rainfall and production."

Running an extensive broadacre cropping operation with husband Nigel and their two children, Anita said the program gave her an opportunity to step away from the business and gain a different perspective.

With the Executive Development Program bringing together farmers from across Australia and New Zealand, Anita said the "informal networking was just as invaluable as listening to the professional speakers".

"We had a huge diverse range of people on the program from a Wagyu beef producer and a north Queensland sugarcane grower to a number of Kiwi dairy and lamb producers," she said.

"The people in the group represented all different ages, stages, industries and goals and gave a range of perspectives on how they have dealt with work-life balance, succession and seeing the bigger picture."

Rabobank

With each course capped at 35 people, Anita said the size of the group meant you could open up to one another and forge friendships.

“The group were really supportive of one another, whether that be people opening up about the challenges of intergenerational farming, growing the business or mental health,” she said. “Any concerns were addressed and there was also lots of support from the professionals giving the sessions.”

The program, she said, also included some sessions for partners to attend during the second module.

“Nigel came over for the partner component of the program and since then, we have visited some fellow participants up at Derby.”

Encouraging others to attend the program, Anita said tertiary qualifications were not required. “Everyone’s background was very diverse from those that had grad qualifications to those that had gone up through the family ranks,” she said.

Since completing the program, Anita said their business had been focussed on managing soil health, variety selection, maximising productivity, risk management and cost structures.

“Nigel and I have just had our 24th harvest and it was our best ever,” she said. “We are continually fine-tuning our management and are inherently optimistic about the future.”

This year, the Executive Development Program will be held at the Macquarie Graduate School of Management in Sydney. The first module will run from August 25 to 30, with the second scheduled from July 19 to 24, 2020.

Applications for the EDP close on Thursday, April 26. Further information and applications can be found at https://www.rabobank.com.au/agribusiness/business-management-programs/ or by contacting Rabobank Dalwallinu on 08 9661 0900.

SINGLE TOUCH PAYROLL

Glynn Judd
Senior Manager
RSM

IN September last year I wrote about Single Touch Payroll (STP). STP will streamline payroll reporting by changing the way employee payment information is reported to the ATO.

Under new legislation, from 1 July 2019 all employers are required to utilise STP compliant software to process employee payments. Each time an employer makes an employee payment, the STP compliant payroll software will collate and send salary and wage, pay as you go withholding and superannuation information to the ATO. The ATO will use this information to ensure:

- Pay as you go withholding payments are reported correctly and paid on time;
- Superannuation payments are paid on time and match amounts processed through your SuperStream solution, and;
- All employee PAYG information is captured within the ATO's database.

If you haven't set your payroll software up to be STP compliant, I recommend setting it up now. While this may sound like a daunting task, the good news is that most software packages have already updated their systems to be STP compliant. This includes MYOB, Xero and Agrimaster.

MYOB

MYOB AccountRight Live, MYOB Essentials and MYOB AccountRight Classic are all STP compliant software solutions. Given MYOB is a single accounting and payroll solution, there is no need to download additional MYOB programs to facilitate this process.

MYOB has published checklists and instructions to set-up your STP reporting. These checklists and instructions can be found on the MYOB help website.

Alternatively, MYOB has interactive e-learning and classroom courses available to assist you to become STP ready.

Xero

Like MYOB, Xero is an STP compliant, single accounting and payroll solution. There is no need to download any Xero "add on's" or programs to gain STP compliance.

Xero has also published check lists and instructions to set-up your STP reporting. These checklists and instructions can be found on the Xero help website.

Video instructions are also available on the Xero website to assist you setting up your STP reporting.

Agrimaster

To process employee pay and superannuation through Agrimaster and meet your STP reporting obligations, you will need to have access to WageEasy.

As with Xero and MYOB, Agrimaster has published a comprehensive list of instructions to set-up your STP reporting through WageEasy. These can be found on the Agrimaster website.

Agrimaster has also recorded an STP Webinar and uploaded this to their website to assist you through the set-up process.

Alternative Options

If you don't use MYOB, Xero, Agrimaster or another STP compliant software solution, there are a number of no cost and low cost 3rd party solutions available. The ATO has published a list of these providers on their website. If you are considering using a 3rd party provider, you should read their terms and conditions carefully and consider obtaining independent advice before subscribing to a product.

You can also use a registered BAS or Tax Agent to report your STP obligations.

Accounting Program Summary

Program	STP Compliance	Additional Program Required	Set-Up Information Available	Connection to ATO	Processing Instructions	Video Instructions
MYOB	Requires Set-UP	No	Online	Yes	Online	Yes
XERO	Requires Set-UP	No	Online	Yes	Online	Yes
AGRIMASTER	Requires Set-UP	Yes	Online	Yes	Online	Yes

If you need assistance setting up your payroll software to comply with STP reporting requirements or you have queries regarding your STP obligations, our team at RSM Moora are available to assist you.

BOEKEMANS MACHINERY DALWALLINU A SILVER PARTNER FOR THE LIEBE GROUP

THE Liebe Group are pleased to welcome a new Silver Partner to the group this month with Boekemans Machinery Dalwallinu.

Liebe Group partners are an integral facet of the success of the group and since our inception we have developed long and valuable relationships with a number of organisations who have mutual interests to the Liebe Group. These strong partnerships have given the group diversity, a level of security and the capacity to build a sustainable and healthy future.

Boekeman Machinery is a family run Machinery Dealership in the Central Wheatbelt, Western Australia, with four branches located in Dalwallinu, Dowerin, Northam and Wongan Hills.

Established in 1968, Boekemans place the experience of their customers as the most important factor that they value. They pride themselves on operating their business ethically and hold themselves accountable to high standards of professionalism, fairness, honesty and integrity.

Our partners add value to the group through in-kind support, products or services and they see the relationship with the group as a meaningful way to stay in close contact with the grass roots innovators of the industry. We look forward to building an on-going relationship with our latest Silver Partner and thank them fo their support towards the Liebe Group.

The Boekemans Machinery Dalwallinu team

CELEBRATING MILESTONE PARTNERSHIPS WITH RSM, BAYER AND PACIFIC SEEDS

LIEBE Group are excited to be celebrating 15 years of partnership with RSM, and 10 years with Bayer and Pacific Seeds in 2019.

Over the years, RSM have been involved in many Crop Updates, Spring Field Days, Women's Field Days, Liebe Group annual dinners and a number of workshops. They have submitted countless newsletter articles which have provided Liebe Group members with timely and relevant information throughout the year.

Over the last ten years, Bayer and Pacific Seeds have been involved in over 20 trials and a number of demonstration sites at each Main Trial Site. Liebe Group are excited that both partners will continue their research at the 2019 Main Trial Site.

The Liebe Group thank RSM, Bayer and Pacific Seeds for their ongoing support and look forward to working with them in the future.

Judy Snell, RSM, at the Liebe Group annual dinner 2017.

Matt Willis, Bayer, presenting his trial at the 2018 Spring Field Day.

Steve Lamb, Pacific Seeds, presenting the Canola Variety Trial at the 2018 Spring Field Day.

TESTING THE ADAPTATION OF LUPINS TO MARCH SEEDING IN THE NORTHERN AGRICULTURAL REGION

Martin Harries
Research Agronomist
DPIRD

Stephanie Boyce
Officer
DPIRD

KEY messages

- Current lupin varieties are not be well suited to sowing in early autumn in the Northern Agricultural Region.
- This limits the ability to capture March or early April rains.
- Trials will be expanded in 2019 using a greater range of germplasm over a wider range of sites, including the southern region.
- In the long term, testing other broadleaf crops in the same way would be useful to identify species best suited to early sowing.

Aim

To investigate the growth and development of narrow-leafed lupin (Lupinus angustifolius L.) varieties when sown mid-March compared to the traditional ANZAC Day sowing date.

Background

Since 1967 there have been 30 angustifolius varieties released; 24 unresponsive to vernalisation, 4 with an obligate vernalisation requirement and 2 with a facultative vernalisation requirement. All varieties released since 1988 are unresponsive and have been increasingly earlier flowering and maturing with higher harvest index. This has been an extremely successful breeding strategy which has improved adaptation of angustifolius lupin to the short season environment, but has led to a narrowing of the plant types within breeding programs (Berger et al 2012).

Recently in the Northern Agricultural Region there has been a trend towards sowing crops earlier. The most common species sown early is canola, however establishment of this small seeded species can be difficult in the drying soil conditions that occur in March (Harries et al 2019). It may be easier to establish species that can be sown deeper in these conditions but we don't know if other commercially cultivated broadleaf species develop at appropriate times from these sowing dates.

To test this with narrow-leafed lupin a range of cultivars release from the 1970s' to 2017 were sown alongside each other at two dates to assess suitability of lupins for March planting in the Northern Agricultural Region.

Aim

In 2018 a trial was conducted at the Department Primary Industries and Regional Development Woorree Research annex. Treatments included 7 lupin varieties: Unicrop (1973), Chittick (1982), Geebung (1987), Gungurru (1988), Tanjil (1998), Mandelup (2004) and Jurien (2015) by 2 sowing dates, March 15 and April 26. Plots were hand sown 1m long and irrigated from March to mid-May to ensure germination and growth free from water stress. Three representative plants per plot were observed twice weekly for development stage (as per Dracup and Kriby 1996). Plants were harvested at maturity and assessed for growth and grain yield components.

GOVERNMENT OF WESTERN AUSTRALIA
Department of Primary Industries and Regional Development

Results

Development

Varieties that were unresponsive to vernalisation developed rapidly when sown in March taking between 49 and 54 days to flower on the main stem, in early May (Figure 1a). This was delayed by 21 to 17 days, to late June/early July, when sown on April 26, due to slower accumulation of thermal time in the cooler conditions (Figure 2 a). From March 15, Chittick flowered after 152 days in mid-August, which is a reasonable flowering date for this environment while Geebung flowered too late for this environment, on September 10. Flowering of these varieties was accelerated by 31 and 51 days when sown later, on April 26, due to vernal and photoperiod responses (Table 1).

Table 1: Date and days to start of flowering on the main stem

			Sowing Date				
			March 15		April 26		
Variety	**Release Year**	**Vernalisation response**	**Date of first flower**	**Days to first flower**	**Date of first flower**	**Days to first flower**	**Days difference**
Jurien	2015	Unresponsive	3-May	49	29-Jun	61	12
Mandelup	2004	Unresponsive	3-May	49	4-Jul	65	16
Tanjil	1998	Unresponsive	8-May	54	8-Jul	68	14
Gungurru	1988	Unresponsive	5-May	51	5-Jul	68	17
Geebung	1987	Obligate	10-Sep	179	3-Sep	129	-50
Chittick	1982	Facultative	14-Aug	152	25-Aug	121	-31
Unicrop	1973	Unresponsive	3-May	49	7-Jul	66	17

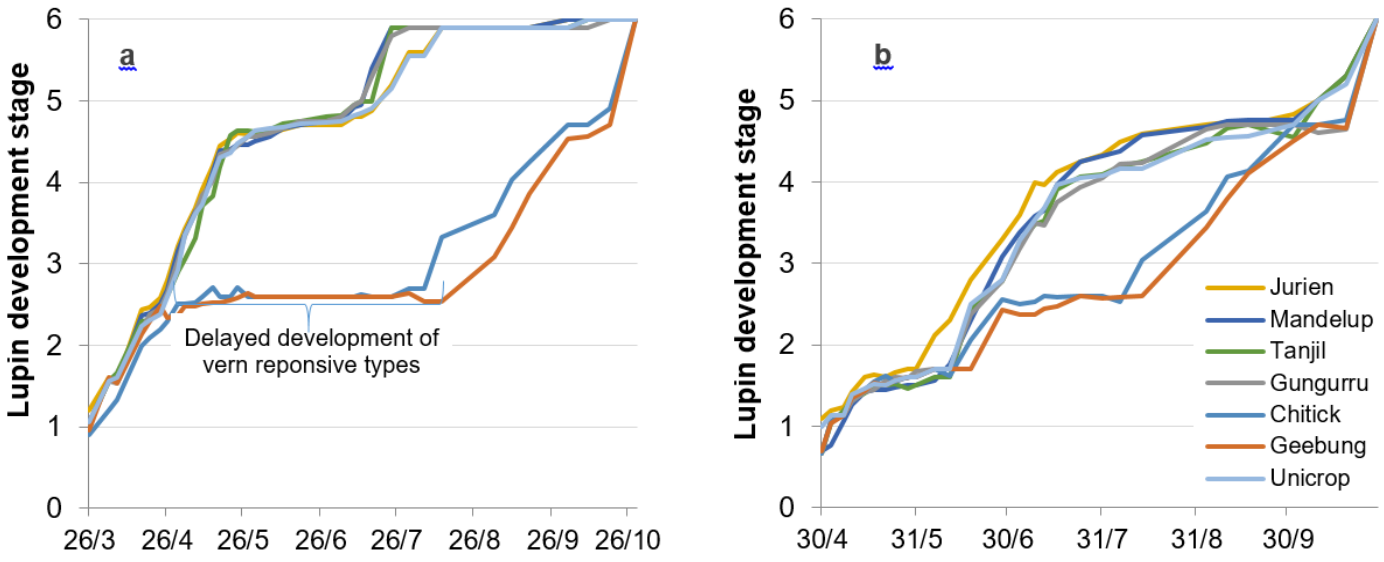

Figure 1. Development of 7 lupin cultivars from two sowing dates, March 15 (a) and April 26 (b). Stage 3.4 = Open flower.

Plant growth and yield

The varieties with vernalisation requirements produced more biomass (Figure 2), podded at a greater height from the ground and had lower harvest index (P <0.001) (Table 2). Sowing date has less effect: height to lowest pod and biomass were greater at the first sowing time (P <0.001), biomass was similar and harvest index was lower but not significantly (Table 2). There was an interaction of variety and sowing time on lowest pod height, vern responsive types with much greater variation between sowing dates.

Table 2. Pod height (cm), biomass (g) and harvest index of 7 lupin varieties sown on March 15 and April 26 at Geraldton in 2018.

	Lowest pod height			Biomass			HI		
Variety	March	April	Var av	March	April	Var av	March	April	Var av
Jurien	30	30	30	161	175	168	0.42	0.32	0.37
Mandelup	22	19	21	161	163	162	0.30	0.33	0.31
Tanjil	18	20	19	200	148	174	0.36	0.26	0.31
Gungurru	18	13	15	219	166	193	0.32	0.45	0.39
Chittick	121	52	86	241	391	316	0.27	0.38	0.33
Geebung	145	132	138	602	420	511	0.12	0.27	0.19
Unicorp	20	22	21	87	91	89	0.38	0.29	0.33
TOS Av.	95	68		310	300		0.25	0.31	
P TOS		<0.001			NS			NS	
Lsd TOS		4							
P Var		<0.001			<0.001			<0.001	
Lsd Var		7			131			0.08	
P Interaction		<0.001			NS			NS	
Lsd Interaction		10							

Figure 2. Jurien left and Geebung right sown on March 15 at Geraldton Western Australia, taken June 29

Conclusion

This small pilot experiment highlights that current lupin varieties flower too early when sown in March in this environment while the older obligate vernalisation varieties still flower too late with very low harvest index. If growers are to continue sowing earlier or use lupins to take advantage of early autumn rains varieties that are better suited to these sowing times are required. It would be interesting to test whether a restricted branching type, such as Tallerack, with a vernalisation requirement would combine constrained biomass production and delayed development to improve harvest index from an early sowing date. Trials will be expanded in 2019 using a greater range of germplasm over a wider range of sites, including the southern region. In the long term testing other broadleaf crops in the same way would be useful to identify species best suited to early sowing.

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OATS TOLERANCE TO TRIFLURALIN AND OTHER HERBICIDES

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GOVERNMENT OF WESTERN AUSTRALIA

KEY messages

WA oat varieties showed good tolerance to trifluralin at the permit rate (Permit Number 84040) and its mixture with terbuthylazine at label rate when incorporated by seeding with knife-points and press wheels seeding system.

Oats should be sown at a speed between 4.5km/h to 9km/h to avoid crop damage.

New oat varieties have shown sensitivities to the following herbicides at label rates and timings:

- Bannister to diuron+ MCPA amine and pyrasulfotole + MCPA ester (Precept®)
- Durack to chlorsulfuron (Glean®) and 2,4-D amine dual salt (Amicide® Advance 700)
- Williams to chlorsulfuron, bromoxynil + MCPA ester + dicamba (Broadside®), picolinafen + bromoxynil + MCPA ester (Flight®) and 2,4-D amine dual salt.
- Carolup, an old variety used as a standard in the trials, showed sensitivity to chlorsulfuron.

Aims

The trials undertaken by the Department of Primary Industries and Regional Development (DPIRD) in the last 12 years identified the potential use of trifluralin as an incorporated-by-seeding herbicide to suppress/control certain annual grasses and broadleaf weeds in both oaten hay and grain oat crops. The Grain Industry Association of Western Australia (GIWA) Oat Council secured a permit (permit number 84040) through Australian Pesticide and Veterinary Medicines Authority (APVMA) allowing the use of trifluralin up to 960g/ha in oats. The aim of this research was to:

- Identify the tolerance of current oat varieties to trifluralin and other pre-emergent herbicides,
- Investigate the interaction of seeding speed with trifluralin and other pre-emergent herbicides in William, and
- Identify the tolerance of new oat varieties to post-emergent herbicides.

Method

A total of 11 trials were conducted under weed free conditions on loamy sand to sandy loam soils (pH-Cacl2 4.7 - 5.2 and OC 1.52 – 2.43%) using criss-cross design at DPIRD Katanning Research Facility from 2006 to 2017. Five trials (out of 11) during 2006 - 2008, 2015 and 2017 included trifluralin as treatments. During 2006 and 2007 the trials were sown using Chamberlain 753 combine fitted with superseder-points at 21cm row spacing and during 2008 and 2017 using Bourgault 8810 Airseeder fitted with knife-points (split boot) and press wheels at 25cm row spacing and these travelled at 7-9km/hr speed. The remainder of the trials were sown with a coneseeder fitted with knife-points and press wheels that travelled at 4–5km/h speed. The trials were sown in mid-June to early July each year to a depth of 3-4cm using around 75kg/ha seed.

The herbicide treatments were applied to the variety plots in three replications using a spray rig fitted with air induction nozzles and shields on boom and the sprayer was calibrated to deliver 75-80L/ha water volume. Plot length varied from 9.5 to 10.5m with plot centre to centre 1.8–2.5m. 2006 was the driest season amongst all the trial seasons with 186mm rainfall from May to October at Katanning.

In 2017 a study to identify interaction of seeding speed with pre-emergent herbicides was undertaken using Williams oats (part of an oats herbicide tolerance trial). Williams was sown at two speeds of 4.5km/h and 9km/h on a loamy sand soil in 10m wide strips at right angles to the direction of herbicide application with 3 replications on 14 June. The remaining 4 varieties in the trial were sown at 9km/h speed only. Every 6th plot was kept as an untreated control to assess the spatial variability. Barley stubbles were raked from the site before trial seeding. At the time of pre-emergent herbicide treatments application and trial seeding, gravimetric soil moisture content at 0-10 and 10-20cm depth was 9.2 and 7.6%, respectively. Seeding furrow depth was measured from 10 randomly selected spots within each speeding speed and replication on 15 June and 14 July 2017. Oat plant establishment was determined by counting plants across all varieties from a 1m x 1m quadrat in 3 locations per plot on 14 July. Twenty plants were selected randomly from both the seeding speed treatments per replication (untreated control area) on 14 July to measure coleoptile length using a standard measurement method. Williams was assessed for hay yield across 2 speeds by cutting its plants from two 1m X 1m quadrats per plot at milky soft dough stage and oven drying at 60oc for 72 hrs. After drying, the hay samples were used to determine the number of heads per metre square. The trial was harvested on 20 December 2017 and total rainfall from May to October was 263mm.

Table 1: The results presented in the following tables we summarised using following criteria:

- not tested or insufficient data
✓ no significant yield reductions at the label recommended rates in (Z) trials
N (w/z) narrow crop safety margin, significant yield reductions at higher than the label recommended rate, but not at the label recommended rate. Significant event occuring in w trials out of Z trials conducted. Eg (2/5) = tested in 5 trials, 2 trials returning with a significant yield reduction.
x% yield reduction (1/z), significant yield reduction at recommended rate in 1 trial only out of z trials conducted (warning).
x - y% yield reductions (w/z), significant yield reductions at recommended rate in w trials out of z trials conducted (warning), w = 2 or more trials.

Crop safety margins: Higher than label rates of some the herbicides were included in the trials to determine the crop safety margin of the herbicides at the maximum label rates. Good crop safety margin means that a herbicide at its maximum label rate and at the higher rate(s) was tolerated well by a crop variety. Narrow crop safety margin for a herbicide indicates that the variety tolerated the maximum label rate well, but at higher than the label rate(s) there was significant yield loss. A narrow crop safety margin implies that when spraying under less than optimal conditions, herbicide damage and yield loss may occur even at the label rate. For example, when overlapping herbicide; spraying under wet conditions (for soil active and residual herbicides) and /or there are stressed plants due to abiotic/biotic factors.

Results and Conclusions

Tolerance of oat varities to trifluralin and other pre-emergent herbicides (Table 2)

Trifluralin at 960g/ha (the permit rate) alone and in mixture with terbuthylazine at 1050g/ha, terbuthylazine alone and diuron + s-metolachlor at 500g + 480g/ha applied before seeding were tolerated well with good crop safety margin by all the oat varieties tested. However, diuron + metolachlor at label rate caused statistically significant grain yield loss in Carolup and Williams during 2012 and in Durack during 2014.

Trifluralin alone and in mixture with terbuthylazine at permit/label rate resulted in lower crop establishment in Bannister, Durack, Kowari and Williams (all the varieties in the trial) sown at 9km/h speed during 2017, except trifluralin alone x Williams interaction was not statistically significant. Similarly, diuron + s-metolachlor at higher than label rate also resulted in significantly (statistically) lower plant density in Bannister and Kowari, and terbuthylazine at higher rate in Bannister (data not shown). However, this negative effect on plant population appeared to be compensated with higher number of effective tillers and biomass, and ultimately there was no statistically significant negative effect on grain yield of these varieties.

Trifluralin, terbuthylazine and their mixture, and diuron + s-metolachlor at the permit/label rates also had no statistically significant negative effect on hay yield of Bannister, Carolup, Kojonup, Durack and Williams during 2015, while Kojonup registered narrow crop safety margin for triflurlain + terbuthylazine at 960g + 1050g/ha rate. Similarly, Wandering sprayed with pre-emergent trifluralin at the permit and higher rate produced hay yield statistically equal to the untreated control plots during 2007. Hay yield was only recorded across all the 5 varieties tested during 2015.

Table 2: Oat varieties' response to trifluralin and other herbicides applied before seeding as measured by grain yield from 2006 to 2017 at Katanning.

Herbicides	Rate a.i./ha	Year of testing	Bannister	Carolup	Durack	Kojonup	Kowari	Mitika	Possum	Wandering	Williams	Wintaroo
			2011-13, 2015, 17	2008, 2010-12, 15	2014-15, 2017	2006-07, 2015	2017	2006-07	2006	2006-08	2012-2017	2008
Trifluralin	720g	2008	-	√ (1)	-	-	-	-	-	√ (1)	-	√ (1)
Trifluralin	960g	2006-07 2015,17	√ (2)	√ (1)	√ (2)	√ (3)	√ (1)	√ (2)	√ (1)	√ (2)	√ (2)	-
Trifluralin + terbuthylazine	960g + 1050g	2015, 17	√ (2)	√ (1)	√ (2)	√ (1)	√ (1)	-	-	-	√ (2)	-
Terbuthylazine	1050g	2015-17	√ (2)	√ (1)	√ (2)	√ (1)	√ (1)	-	-	-	√ (3)	-
Diuron + metolachlor	500g + 360g	2010-14	√ (3)	**16 (1/3)**	**9 (1/1)**	-	-	-	-	-	**9 (1/3)**	-
Diuron + s-metolachlor	500g + 480g	2015,17	√ (2)	√ (1)	√ (2)	√ (1)	√ (1)	-	-	-	√ (2)	-
Diuron + s-metolachlor + terbuthylazine	500g + 480g + 1050g	2017	√ (1)	-	√ (1)	-	√ (1)	-	-	-	√ (1)	-

See Table 1 for explanation of shading and marking. a.i = active ingredient. The products and rates used in the trials were TriflurX® 480 at 1.5L/ha (trifluralin 720g/ha), TriflurX® 480 at 2L/ha (trifluralin 960g/ha), Terbyne® Xtreme® at 1.2kg/ha (terbuthylazine 1050g/ha), Dual® at 0.5L/ha (metolachlor 360g/ha) and Dual Gold® at 0.5L/ha (s-metolachlor 480g/ha).
Treatments were compared with untreated controls within each variety.

Interaction of seeding speed with trifluralin and other pre-emergent herbicides in Williams (Table 3)

An increase in seeding speed from 4.5 to 9km/h where trifluralin, and other pre-emergent herbicides at permit/label rate were applied did not result in statistically significant negative effect on crop establishment, number of heads per metre square (data not shown), hay yield and grain yield of Williams.

Seeding at the faster speed (9km/h) in combination with

- A three way mix of diuron + s-metolachlor + terbuthylazine at label rate reduced crop establishment but had no statistically significant negative effect on hay and grain yield,
- A higher rate of trifluralin reduced crop establishment and hay yield,
- A higher rate of trifluralin + terbuthylazine reduced grain yield significantly (statistically) compared to seeding at slower speed (4.5km/h), indicating narrow crop safety margin for these treatments.

This effect could be due to overthrow of herbicide concentrated treated soil in the adjacent furrows. The seeding furrow depth was around 1cm shallower under 9km/h speed as compared to 4.5km/h speed. Total rainfall within first month of trial seeding was 40mm with a single heaviest rainfall event of 11mm on 2 July 2017. This didn't appear to cause any furrow filling as the there was no difference in the depth of seeding furrows measured a month apart starting from one day after trial seeding (15 June). The average coleoptile length of Williams in the normal furrows (intact and not under wheel tracks) under both the speeds was very similar (3.6cm in 4.5km/h and 3.3cm in 9km/h speed).

The results indicate that trifluralin alone or in mixture with terbuthylazine at permit/label rate could be applied safely on a loamy sand soil by seeding oats with knife-points and press wheels at a speed between 4.5 to 9km/h. Further research work is required to validate these results as trifluralin selectivity in oats is largely due to placement of the seed away from treated soil and factors like soil type, soil moisture, point types, row spacing, crop residue, seeding speed etc determine the soil throw into the adjacent rows.

Table 3: The effect of pre-emergent herbicides and seeding speed on number of plants, hay yield and grain yield of Williams (% of 4.5km/h seeding speed) at Katanning during 2017. All the herbicides were applied before crop seeding.

		Number of Plants		Hay yield		Grain yield	
Herbicides	**Rate a.i./ha**	**4.5km/h**	**9km/h**	**4.5km/h**	**9km/h**	**4.5km/h**	**9km/h**
Untreated Control		100 (174 m^{-2})	100	100 (6.9t/ha)	95	100 (3.5t/ha)	93
Trifluralin	960g	102	94	105	107	100	93
Trifluralin	Higher rate	103	89	126	109	101	89
Trifluralin + Terbuthylazine	960g + 1050g	94	88	112	98	103	98
Trifluralin + Terbuthylazine	Higher rate	98	91	103	87*	106	87
Terbuthylazine	1050g	100	107	105	101	86	94
Terbuthylazine	Higher rate	100	101	108	110	96	105
Diuron + s-metolachlor	500g + 480g	96	106	99	106	96	97
Diuron + s-metolachlor	Higher rate	98	101	95	107	90	92
Diuron + s-metolachlor + terbuthylazine	500g + 480g + 1050g	101	92	109	97	95	87
Lsd (0.05) Control vs herbicides within each speed or across speeds (1-tail)		7		14		12	
Lsd (0.05) herbicides vs herbicides within each speed or compare speeds at same level of herbicide (1-tail)		9		17		16	
CV (%)		7		13		12	

a.i = active ingredient. The products and rates used in the trials were TriflurX® 480 at 2L/ha (trifluralin 960g/ha), Terbyne® Xtreme® at 1.2kg/ha (terbuthylazine 1050g/ha), Diuron 900 at 556g/ha (diuron 500g/ha) and Dual Gold® at 0.5L/ha (s-metolachlor 480g/ha). Figures in Red are significantly lower than untreated control plots sown at 4.5km/h speed. Figures in Red and/or Yellow are significantly lower than the plots sown at 4.5km/hr speed under same herbicide treatment. * this value is significant at 90% level of confidence.

Tolerance of new oat varieties to post-emergent herbicides (Table 4)

The majority of the herbicides tested are registered for broadleaf weed control in oats. Chlorsulfuron is the only herbicide registered for early post-emergent ryegrass (Group B susceptible) control in oats.
The following herbicides at the label rate and timing have caused a statistically significant grain yield loss in the new varieties in at least two trials. Oat growers should be cautious when using those herbicides with new varieties.

- Chlorsulfuron (eg Glean®) in Carolup, Durack and Williams.
- Bromoxynil + MCPA ester + dicamba (eg Broadside®) and picolinafen + bromoxynil + MCPA ester (Flight®) in Williams
- Diuron+ MCPA amine and pyrasulfotole + MCPA ester (Precept®) in Bannister
- 2,4-D amine dual salt (Amicide® Advance 700) in Durack and Williams. Note that oat tolerance to 2,4-D is generally considered to be lower than for barley or wheat, and if a phenoxy herbicide needs to be used in oats then MCPA amine is the preferred option.

Williams has shown sensitivity to a higher number of herbicides than the other varieties.

Carolup, Durack and Williams's sensitivity to chlosulfuron suggests that oat growers should plan to manage ryegrass effectively in these varieties in seasons before growing oats or plan to use registered pre-emergent herbicides.

The research results presented in Table 4 allow oat growers and agronomists to select safer herbicides for specific new oat varieties, or select the more tolerant variety for their preferred herbicides/mixtures for specific weed control situations.

Note: Always follow label recommendations. The Department Primary Industries and Regional Development, does not endorse the use of herbicides above the registered rate or off-label use of herbicides or off-label tank mixes. Crop tolerance and yield responses to herbicides are strongly influenced by seasonal conditions.

Table 4: New oat varieties' response to post-emergent herbicides for grain yield from 2011 to 2017 at Katanning, WA.

Herbicides	Rate a.i./ha	Timing	Year of testing	Bannister	Carolup	Durack	Kowari	Williams
				2011-13, 2015, 17	2011-12, 2015	2014-15, 2017	2015, 2017	2012-17
Chlorsulfuron + BS1000 (*Glean®*)	15g + 0.1%	Z12-Z13	2011-2015, 17	√ (5)	**10-23 (2/3)**	**9-15 (2/3)**	**19 (1/2)**	**8 - 20 (2/5)**
Bromoxynil + MCPA ester + dicamba (*Broadside®*)	140g + 280g + 40g	Z13-Z14	2011-14, 17	√ (4)	√ (2)	**7 (1/2)**	√ (1)	**8 - 9 (2/4)**
Carfentrazone + MCPA amine (*Affinity Force® + MCPA amine*)	24g + 250g	Z13-Z14	2011-2014	√ (3)	√ (2)	√ (1)	-	√ (3)
Carfentrazone + metribuzin + MCPA amine (*Affinity Force® + Lexone® + MCPA amine*)	24g + 75g + 250g	Z13-Z14	2011	√ (1)	√ (1)	-	-	-
Carfentrazone + metribuzin + MCPA amine (*Aptitude® + MCPA amine*)	18g + 75g + 250g	Z13-Z14	2015-17	√ (2)	√ (1)	√ (2)	√ (2)	√ (3)
Diuron+ MCPA amine	180g + 200g	Z13-Z14	2014	-	-	√ (1)	-	√ (1)
Diuron+ MCPA amine	250g + 200g	Z13-Z14	2013	**5 (1/1)**	-	-	-	**N (1/1)**
Diuron+ MCPA amine	250g + 250g	Z13-Z14	2011-12	**11-15 (1/2)**	√ (2)	-	-	**17 (1/1)**
Diflufenican + MCPA (*Tigrex®*)	25g + 250g	Z13-Z14	2011-14, 18	**10 (1/4)**	√ (2)	**14 (1/2)**	√ (1)	√ (4)
Florasulam + MCPA ester + Uptake™ (*Conclude®*)	4.9g + 250g + 0.5%	Z13-Z14	2011-14	√ (3)	**15 (1/2)**	**7 (1/1)**	-	**7 (1/3)**
Halauxifen + florasulam + MCPA LVE + clopyralid (*Paradigm™ + MCPA LVE + Lontrel™ Advance*)	5g + 80g + 240g + 45g	Z13-Z14	2015	√ (1)	√ (1)	√ (1)	√ (1)	√ (1)
Picolinafen + bromoxynil + MCPA ester (*Flight®*)	25g + 150g + 250g	Z13-Z14	2011-14, 17	**16 (1/4)**	**11 (1/2)**	√ (2)	√ (1)	**11 - 12 (2/4)**
Pyrasulfotole + MCPA ester + Hasten (*Precept®*)	50g + 250g + 1%	Z13-Z14	2011-14, 17	**6-12 (2/4)**	√ (2)	**7 (1/2)**	√ (1)	**9 (1/4)**
Terbutryn + MCPA amine (*Igran® + MCPA amine*)	425g + 300g	Z13-Z14	2014	-	-	√ (1)	-	**6 (1/1)**
2,4-D amine dual salt (*Amicide® Advance 700*)	805g	Z15-Z16, Z31	2011-12,14-15,17	**N (1/4)**	**N (1/3)**	**23- 35 (2/3)**	**17 (1/2)**	**9 - 10 (2/4)**
2,4-D amine (*Amicide® 625*)	812.5g	Z15-Z16	2011-13	**5 (1/3)**	**13 (1/2)**	-	-	**13 (1/2)**

a.i. = active ingredient. Parentheses have names of the herbicide products used in the trials. Herbicide treatments within each variety were compared with untreated control plots (of the respective variety). For information on other oat varieties, please visit https://www.nvtonline.com.au/herbicide-tolerance/

Acknowledgements

We gratefully acknowledge GRDC for funding this research work, AEXCO for funding hay work during 2015, Vince Lambert, Michelle Sampson, and Katanning Research Facilities for technical their assistance. Thanks also to John Moore, Senior Research Officer, DPIRD Albany for his valuable suggestions in the trials planning.

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Paper reviewed by: Dr David Bowran

IMPORTANCE OF SOWING DATE AND STORED SOIL MOISTURE IN CANOLA YIELDS IN YOUR AREA

Imma Farre
Research Officer
DPIRD

ACCORDING to the APSIM-Canola model and local climate records since 1976, the Optimum Sowing Window (OSW) to achieve maximum yields, for a mid-season canola cultivar (i.e. ATR Bonito) in Wongan Hills is early-April to early-May.

We have used the APSIM-Canola model and long-term climate records to simulate yields for fixed sowing dates from mid-March to end-June in Wongan Hills (Figure 1). We have also marked the actual break of season (at least 15 mm rain in three days) for the last 4 years and the simulated yield achieved if canola was seeded at the break of the season each year (open symbols). Note the lost opportunity caused by late breaks at end of May in 2018 (red open square), compared with the April break in 2016 (blue open diamond) (Figure 1). Note also the year to year yield variability and the difference between individual years (colour lines) and the average (black line).

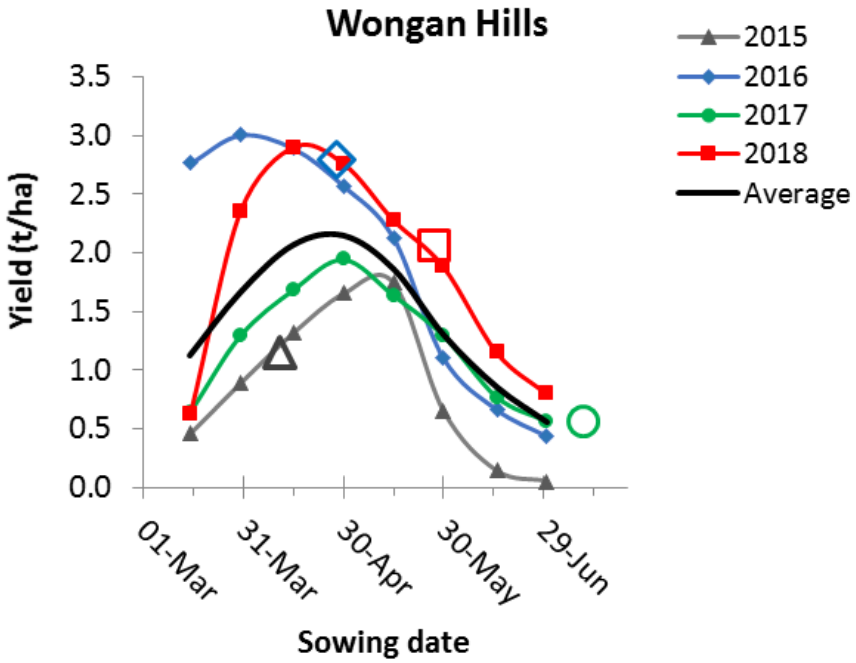

Figure 1. Simulated canola yields for Wongan Hills for sowings from 15-March to 30-June for the years 2015, 2016, 2017, 2018 (colour lines and closed symbols) and the long-term average (black line). Simulated canola yields for 2015 to 2018 if sowing at the break of the season in each year (open symbols).

GOVERNMENT OF WESTERN AUSTRALIA
Department of Primary Industries and Regional Development

Chances of having a break in the season

Looking at the rainfall data for the last 43 years, the probability of having a sowing opportunity (defined as at least 15 mm rain in 3 days) within the optimum sowing window (OSW is shaded in Table 1) is 56%.

Table 1. Cumulative chance (%) of having a first sowing opportunity, by week (w) and month in Wongan Hills. The Optimum Sowing Window to obtain maximum yield is shaded.

	w1 Apr	w2 Apr	w3 Apr	w4 Arp	w1 May	w2 May	w3 May	w4 May	w1 Jun	w2 Jun	w3 Jun	w4 Jun
Wongan Hills	14	19	33	47	56	65	72	81	86	93	93	93

With late sowing opportunities, it is important to assess the chances of achieving a certain yield by certain sowing date (Figure 2). For example, in Wongan Hills, there is over 80 % chance of getting 1.5 t/ha canola yield when sowing in April, but this is reduced to around 40 % for sowing at the end of May (Figure 2).

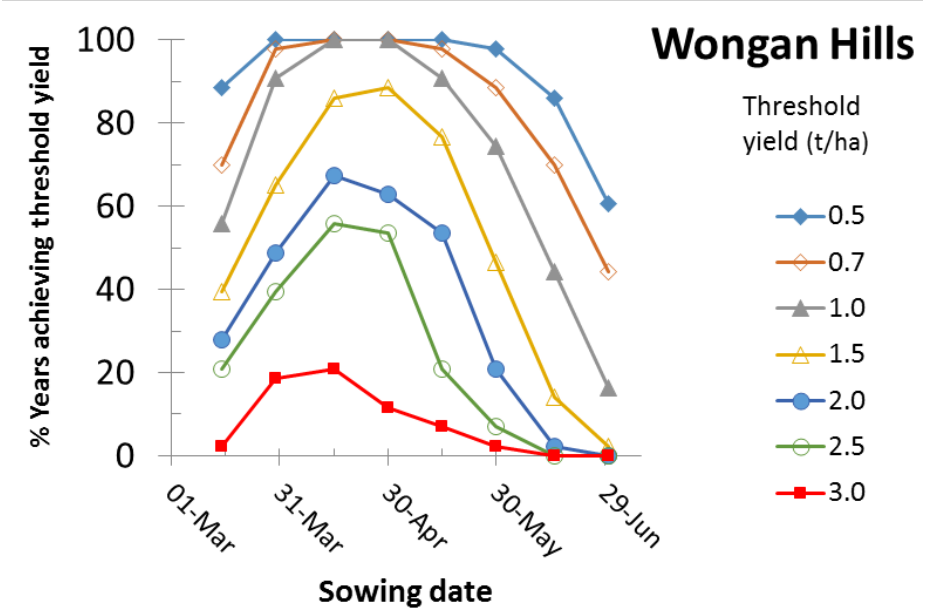

Figure 2. Percentage of years (%) with yield above certain thresholds for the period 1976-2018 for Wongan Hills, sowing ATR Bonito (mid maturity cultivar) for the different sowing dates studied. Threshold yields were 0.5, 0.7, 1, 1.5, 2, 2.5 and 3 t/ha.

Importance of stored soil water at sowing

Starting soil water, defined as plant-available water at sowing, produced on average a yield advantage of 0.35 t/ha in Wongan Hills (Figure 3), based on the last 43 years of climate data. Simulations were done with sowing at the first sowing opportunity each year, with either soil dry at sowing or with 40 mm soil moisture at sowing.

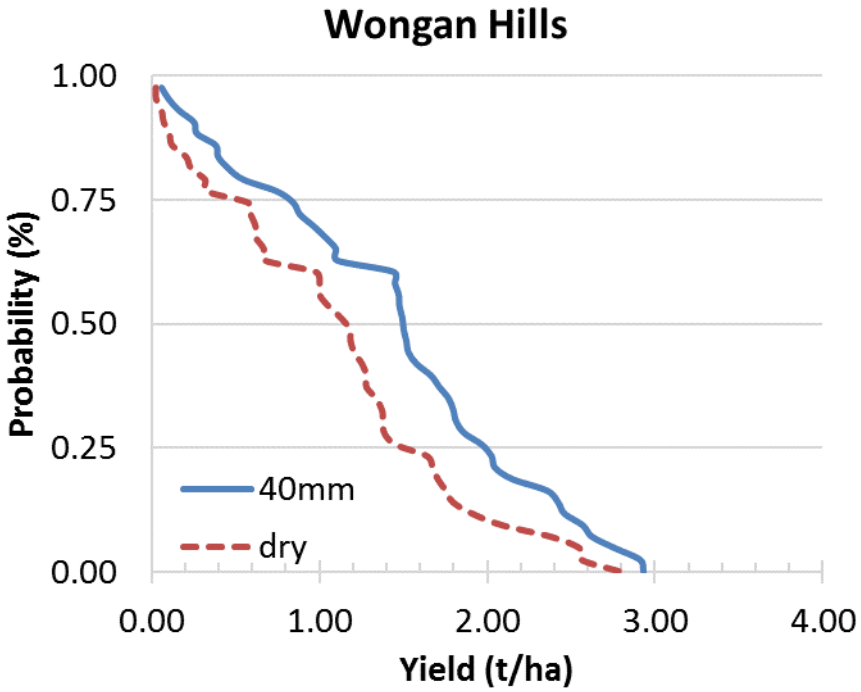

Figure 3. Probability distribution of canola yields for the period 1976-2018, assuming soil is dry at sowing (dry) (dashed line) or has 40 mm of soil moisture at sowing (40 mm) (solid line) for Wongan Hills.

Take home messages

- Early sowing is the key to maximise canola yield in your area. However, profitable yields can be achieved with sowing after the optimum sowing window, depending on season.
- In your location, stored soil moisture at sowing can be an important contributor to final yield, depending on the season type.

Acknowledgements

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GRDC https://www.agric.wa.gov.au/canola/canola-sowing-time-maximise-yield-western-australia

PASSIONATE GROWERS SOUGHT TO SHAPE GRAINS RESEARCH

Julianne Hill
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Regional Cropping Solutions

Natalie Lee
Communications Manger
GRDC

WESTERN Australian grain growers keen to help shape research, development and extension (RD&E) in their port zone are encouraged to apply for positions on their local Regional Cropping Solutions Network (RCSN) group.

Expressions of interest are open for new Grains Research and Development Corporation (GRDC) RCSN grower members across WA's port zone areas.

WA RCSN coordinator Julianne Hill said passionate and committed applicants were sought for the five RCSN groups:

- Kwinana West (two growers)
- Kwinana East (two growers)
- Geraldton (two growers)
- Albany (one to two growers in the medium to low rainfall area)
- Esperance (one grower)

"This is a great opportunity to be part of building ideas for useful, locally-focused RD&E for your port zone," Ms Hill said.

"RCSN members prioritise research ideas, give feedback to GRDC staff and Western Region Panel members and provide guidance when GRDC projects are developed from issues they have prioritised.

"Each RCSN group meets twice a year, usually in its port zone area, and members feed in issues that are impacting on the profitability of growers in their port zone.

"It is imperative that each member has good links within their community, are able to discuss and deliberate over issues raised within the meetings and are able to commit to attending the meetings."

Members are paid a sitting fee and are reimbursed for accommodation and meal costs.

Application forms and more information about the RCSN initiative, including a video and the latest WA RCSN newsletter, can be found at www.rcsn.net.au. Applications close on Friday, May 31 (close of business).

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"YARDSTICK" DEMONSTRATION – KALANNIE

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living farm

This trial report is an update to that published in the Liebe Group 2018/19 R&D Book, p.135

KEY Messages

- 2018 = Decile 6 season cumulative. July-October = decile 10.
- Season responsive to fertiliser rate.
- Canola yielded higher than expected, given late start.
- Poor quality barley with high screenings.

Aim

The primary aim of the 'Yardstick' project is to conduct a series of agronomic demonstrations in wheat, barley and canola that will assist growers in making crop type (wheat, barley or canola), varietal and nitrogen decisions.

Backgroud

As identified by growers through various GRDC RCSN open forums - tight budgets and variable seasons have resulted in a desire to revisit standard fertiliser practices, crop types and varieties.
As such the Yardstick trials have several aims:

1. What crop type gives the best economic return? Wheat, barley or canola?
2. Do different varieties respond differently to different nutrition packages?
3. To cross reference with the National Variety Trials, which generally have higher levels of fertiliser applied due to their aim of identifying the highest yielding germplasm, free from nutritional or budgetary constraints

Reflecting the initial protocol developed by growers in the low rainfall zone of the central wheatbelt, in this initial year fertiliser rates have remained low.
In this trial two rates of phosphorus are tested - either 0 Units (representing a decile 0 season, similar to what was experienced in this area in 2017) or 5 units.
There are 3 rates of nitrogen applied- 0 units, 10, 30 or 50 (the latter being split).
Two varieties of canola, wheat and barley are included in this trial.

In this initial year a basic but robust trial design has been implemented - and it is expected that with the learnings from this trial in 2018 combined with RCSN input that a more district specific program will be implemented for the remaining two years of this study.

All 3 trials (wheat, barley and canola) were dry sown on the 20th May with the first significant rainfall on May 26th.

Trial Details

Property	McCreery property, Cottage Road, Kalannie			
Plot size & replication	10 x 1.75 x 3 replicates			
Soil type	Loamy sand			
Soil pH ($CaCl_2$)	0-10cm: 5.9	10-20cm: 5.3	20-30cm: 5.3	
EC (dS/m)	0-10cm: 0.300	10-20cm: 0.0		
Paddock rotation:	2015: Volunteer pasture	2016: Wheat	2017: Canola/Fallow	
Sowing date	20/05/2018			
Sowing rate	Canola aim 40 plants/m^2, Wheat aim 140 plants/m^2, Barley aim 150 plants/m^2			
Fertiliser application				
(kg-nutrient/ha)	Decile 0	Decile 3	Decile 6	Play the season
Nitrogen (Pre)	0	10	30	30
Nitrogen (Post)	0	0	0	20
Phosphorus	0	5	5	5
Herbicides, insecticides & fungicides	**Wheat Pre-emergent:** 118 g/ha Sakura, 2 L/ha trifluralin, 250 g/ha diuron, 75 mL/ha Lontrel Advanced **Wheat Post-emergent** 800 mL/ha Velocity 400 mL/ha Aviator Xpro	**Barley Pre-emergent:** 2 L/ha trifluralin, 1.6 L/ha Avadex, 250 g/ha diuron, 75 mL/ha Lontrel Advanced **Barley Post-emergent** 800 mL/ha Velocity 400 mL/ha Aviator Xpro	**Canola Pre-emergent:** 1 L/ha propyzamide, 1.1 kg/ha atrazine, 200 mL/ha bifenthrin, 75 mL/ha Lontrel Advanced **Canola Post emergent** 1.1 kg/ha atrazine, 500 mL/ha clethodim 600 mL/ha Aviator Xpro (Blackleg spray - due to trial being located on failed canola crop)	
Growing season rainfall	216.5 mm			

Results

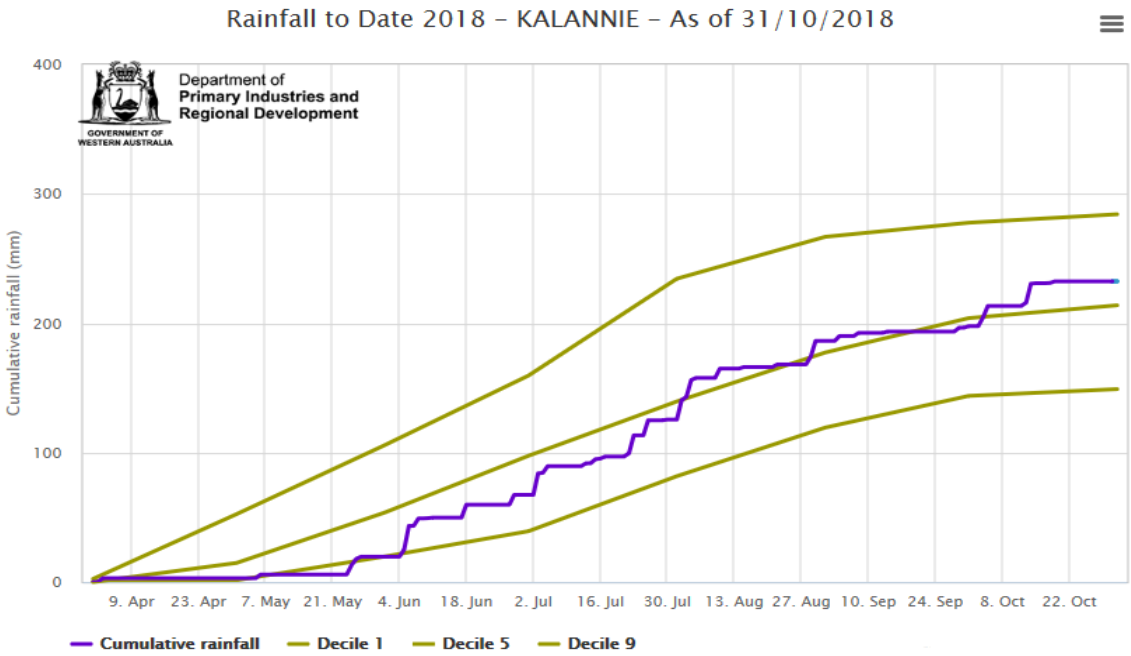

Figure 1: Cumulative growing season rainfall for Kalannie (2018).Source: DPRID rainfall tool.

Wheat

Table 1: Crop establishment (plants/m^2) wheat.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Scepter	114	105	110	108	*109*
Trojan	112	115	111	111	*112*
Means	*113*	*110*	*111*	*109*	
	P (variety)= NS			*l.s.d (P<0.05) = n.a.*	
	P (Decile) = NS			*l.s.d (P<0.05) = n.a.*	
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) = n.a.*	

- No difference in establishment between the varieties at any nutrition package (Decile).

Table 2: Yield (t/ha) wheat.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Scepter	2.34	2.66	2.86	3.08	*2.74*
Trojan	1.19	1.52	1.39	1.57	*1.42*
Means	*1.77*	*2.09*	*2.13*	*2.33*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*0.14*
	P (Decile) <0.001			*l.s.d (P<0.05) =*	*0.198*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- Scepter significantly out-yielded Trojan - to be expected given the late start to the season.
- Rate response to increasing rates of nitrogen: this was particularly evident in the Scepter plots.

Table 3: Protein (%) wheat.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Scepter	9.2	9.6	10.1	10.0	*9.9*
Trojan	10.4	10.6	12.1	13.2	*11.6*
Means	9.8	10.1	11.1	12.0	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*0.22*
	P (Decile) <0.001			*l.s.d (P<0.05) =*	*0.32*
	*P (Variety*Decile) = 0.002*			*l.s.d (P<0.05) =*	*0.45*

- Protein response to nitrogen - with increasing rates of nitrogen we saw increasing levels of protein.
- Decile 6 was the only treatment to receive post emergent nitrogen, which did not have a significant effect in Scepter.
- Varietal differences in protein. Proteins are lower on Scepter than Trojan: but remember, Scepter yielded significantly higher so protein dilution is to be expected.

Table 4: Hectolitre weight (kg/hL) wheat.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Scepter	80.5	81.1	80.4	80.0	*80.5*
Trojan	83.3	82.5	81.5	81.9	*82.3*
Means	*81.9*	*81.8*	*81.0*	*80.9*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*0.73*
	P (Decile) = NS			*l.s.d (P<0.05) =*	*n.a*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- Only varietal difference in hectoliter weights.
- Nitrogen had no effect on hectoliter weights.

Table 5: Screenings (%) wheat.

	Decile 0	Decile 3	Decile 6	Play Season	*Means*
Scepter	2.0	1.4	1.7	1.5	*1.7*
Trojan	1.4	1.3	1.8	1.9	*1.6*
Means	*1.7*	*1.4*	*1.8*	*1.7*	
	P (variety)= = NS			*l.s.d (P<0.05) = n.a.*	
	P (Decile) = NS			*l.s.d (P<0.05) = n.a.*	
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) = n.a.*	

- No effect from nutrition on screenings.
- No difference in screenings between varieties. Given the low yields of Trojan it might have been expected that we may see screenings - but lack of high amounts of post-em nitrogen possibly saved Trojan from screenings.

Barley

Table 6: Crop establishment (plants/m^2) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	113	107	113	107	*110*
Bass	114	107	108	111	*110*
Means	*114*	*107*	*111*	*109*	
	P (variety)= =NS			*l.s.d (P<0.05) =*	*n.a*
	P (Decile) =NS			*l.s.d (P<0.05) =*	*n.a*
	*P (Variety*Decile) =NS*			*l.s.d (P<0.05) =*	*n.a*

- No difference in establishment between the varieties at any nutrition package.

Table 7: Yield (t/ha) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	1.88	2.30	2.33	2.25	*2.19*
Bass	1.51	1.64	1.71	1.84	*1.68*
Means	*1.70*	*1.97*	*2.02*	*2.05*	
	P (variety)= P <0.001			*l.s.d (P<0.05) =*	*0.169*
	P (Decile) =0.03			*l.s.d (P<0.05) =*	*0.239*
	*P (Variety*Decile) =NS*			*l.s.d (P<0.05) =*	*n.a*

- LaTrobe significantly out-yielded Bass, regardless of nutritional package. To be expected given LaTrobe is a quicker variety than Bass.
- Rate response to increasing fertiliser observed in Bass, but not in the higher yielding LaTrobe.

Table 8: Protein (%) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	9.6	12.6	12.7	13.7	*12.2*
Bass	11.3	12.1	13.5	12.7	*12.4*
Means	*10.5*	*12.4*	*13.1*	*13.2*	
	P (variety)= =			*l.s.d (P<0.05) =*	*1.26*
	P (Decile) =0.02			*l.s.d (P<0.05) =*	*1.78*
	*P (Variety*Decile) =NS*			*l.s.d (P<0.05) =*	*n.a*

- High proteins in all but the lowest fertiliser (Decile 0) treatment for LaTrobe.
- Generally increasing proteins with increasing fertiliser.
- Mixed results here - normally we would expect Bass to have higher proteins than LaTrobe, but the results vary. Remarkably high proteins achieved given the low fertiliser rates.

Table 9: Hectolitre weight (kg/hL) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	65.3	64.9	64.9	64.3	*64.9*
Bass	61.0	57.6	61.0	58.7	*59.6*
Means	*63.1*	*61.2*	*63.0*	*61.5*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*n.a*
	P (Decile) = NS			*l.s.d (P<0.05) =*	*n.a*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- No statistically significant differences in hectoliter weights between the varieties.
- No statistically significant differences in hectoliter weights between the fertiliser treatments.

Table 10: <2.2 mm screenings (%) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	4.2	5.4	4.6	5.1	*4.8*
Bass	3.1	2.8	3.7	2.8	*3.1*
Means	*3.7*	*4.1*	*4.1*	*4.0*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*0.409*
	P (Decile) =NS			*l.s.d (P<0.05) =*	*n.a*
	*P (Variety*Decile) =0.020*			*l.s.d (P<0.05) =*	*0.818*

- Significantly higher small screenings in Latrobe than Bass.

Table 11: 2.2-2.5 mm screenings (%) barley.

	Decile 0	Decile 3	Decile 6	Play Season	Means
LaTrobe	37.6	48.0	46.0	51.7	*45.8*
Bass	23.3	25.1	31.0	30.1	*27.4*
Means	*30.4*	*36.6*	*38.6*	*40.9*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*2.449*
	P (Decile) <0.001			*l.s.d (P<0.05) =*	*3.463*
	*P (Variety*Decile) =0.04*			*l.s.d (P<0.05) =*	*4.898*

- Generally increasing screenings with increasing fertiliser rate.
- Less screenings in Bass than in Latrobe: this is to be expected with Bass being a variety that is known for its plump grain.

Canola

Table 12: Crop establishment (plants/m^2) canola.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Hyola 559	47	49	47	47	*48*
InVigor T4510	46	48	43	45	*46*
Means	*47*	*48*	*45*	*46*	
	P (variety)= = NS			*l.s.d (P<0.05) =*	*n.a*
	P (Decile) = NS			*l.s.d (P<0.05) =*	*n.a*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- No difference in establishment between the varieties at any nutrition packages (Deciles).

Table 13: Yield (t/ha) canola.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Hyola 559	1.35	1.43	1.51	1.62	1.48
InVigor T4510	1.16	1.34	1.37	1.50	1.34
Means	1.25	1.39	1.44	1.56	
	P (variety)= = 0.001			*l.s.d (P<0.05) =*	*0.073*
	P (Decile) <0.001			*l.s.d (P<0.05) =*	*0.103*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- Significantly higher yields in Hyola 559TT than InVigorT4510 in this trial.
- Both varieties showed a significant rate response to fertiliser (Decile).
- Excellent yield achieved by these varieties under comparatively low fertiliser rates and given the late break to the season.

Table 14: Oil (%) canola.

	Decile 0	Decile 3	Decile 6	Play Season	Means
Hyola 559	47.3	47.3	47.3	46.3	*47.1*
InVigor T4510	46.5	45.5	44.9	44.8	*45.4*
Means	*46.9*	*46.4*	*46.1*	*45.6*	
	P (variety)= <0.001			*l.s.d (P<0.05) =*	*0.41*
	P (Decile) = 0.002			*l.s.d (P<0.05) =*	*0.58*
	*P (Variety*Decile) = NS*			*l.s.d (P<0.05) =*	*n.a*

- Higher oil content in Hyola 559TT than InVigorT4510 in this trial.
- Response to fertiliser (decile). Results show decreased oil content with increasing fertiliser rate.

Comments
These trials were designed to evaluate the differences between wheat, barley and canola under differing fertiliser regimes, as denoted by seasonal deciles. Cumulative growing season rainfall in 2018 finished as decile 6 however remained below decile 5 until after tillering - May = decile 1-2, June = decile 3-4, July = decile 5-6, August-October = decile 5-7. Cumulative rainfall from July-October = Decile 10.

Even the top rates of fertiliser were generally lower than what many used in 2018, however previous "Yardstick" trial work has shown the varieties performance is generally independent of fertiliser regime' i.e. a good variety is still a good variety regardless of whether it receives little or a lot of fertiliser.

These trials largely support this, with the differences observed being mainly due to the maturity length of the varieties rather than any particular variety having superior fertiliser use efficiency. This was particularly apparent as these trials were deliberately set up with two different maturity length varieties, with the quicker maturing line almost always out-yielding the longer line.

As might be expected from a season like 2018, in all crop types we saw an increase in yield with increasing fertiliser rate. In fact the rate response curve suggests that some yield had been forfeited from lack of nitrogen even in the top rate (the play-the-season).

When comparing crop types (i.e. which crop is better?) it's hard to compare: the better varieties in each crop type are all quite comparable if you were to look at a gross $ return/ha. Two things that should be noted are firstly, the canola was probably higher yielding than might have been expected for such a late start and for what was across all deciles a fairly conservative fertiliser regime. The second point of note was the poor quality of the barley, with extremely high plump grain screenings in both varieties.

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HERBICIDE RESISTANCE IN FOCUS PADDOCKS OF WA CHAMPION FARMERS

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KEY messages

- Weed seed samples were collected from farms implementing harvest weed seed control.
- PRE herbicides allow effective ryegrass control, POST herbicide efficacy is compromised by resistance.
- PRE and POST herbicide mixtures increase herbicide efficacy, suppress weed populations numbers and minimize herbicide resistance risk.
- AHRI will conduct herbicide resistance testing to guide WA farmers in effective herbicide choices

Background & Aims

In Australia herbicide resistance has increased in number of weed species and herbicides affected. New cases of herbicide-resistant weeds continue to be reported due to herbicide overreliance to manage very large farm operations. Grain growers have responded to the escalating herbicide resistance challenge by adopting harvest weed seed control and new pre-emergence herbicides to control multiple resistant weeds.

As grain growers demand simplicity in their large programs to achieve effective weed control we envisage that there is an increasing need, with particular focus on the GRDC Western Region, for a centre specialized to test herbicide resistance in weeds by targeting problematic "focus" paddocks. Such a centre would provide independent herbicide testing aimed at early detection of herbicide resistance to commonly adopted herbicides. A unique feature of this centre would be the focus on new herbicide solutions developed by chemical companies and/or new uses of existing chemistries. The knowledge generated would guide technical advice on weed control solutions to growers and consultants. The economic benefits of a new solution for the control and management of herbicide-resistant weeds could result in a reduction in costs for weed control (approx. $10/ha) and more importantly boost growers' confidence over their large investments in weed control.

Method

In 2018 a proof-of-concept study was conducted to assess herbicide resistance in annual ryegrass seed samples collected from "focus paddocks" of 10 champion growers' farms in the Kwinana West Port Zone where harvest weed seed control has been practiced.

Plants were grown outdoors at UWA during the autumn/winter season. Herbicide resistance status was determined by treating germinating seeds or two-leaf seedlings with a range of herbicide modes of action. AHRI large stock of well characterized herbicide-resistant and herbicide-susceptible weed populations were used as control. Seventeen samples of ryegrass were examined a comprehensive herbicide resistance testing. Herbicide treatments, MoA and dosages are in Table 1. Plant survival 0 - 5% indicates an herbicide 'susceptible' sample, 6 - 19% survival identifies 'developing resistance' and survival ≥ 20% is interpreted as herbicide 'resistance'.

Results

Plant survival across all samples to POST herbicides was 25% denoting substantial herbicide resistance across weed samples, whereas survival to tested PRE herbicides was 1% which reflects the current effective ryegrass control in the field when PRE herbicide area adopted.

POST EMERGENCE
GROUP A

Diclofop-mehtyl
As expected and reported in several random herbicide resistance surveys focused on annual ryegrass in WA, resistance to diclofop-methyl was high in frequency (94% samples tested) with >70% plant survival observed in those 16 herbicide-resistant samples - 67% survival overall (Table 1). Plants surviving diclofop-methyl were treated with a full label dose of clethodim (250ml of commercial product) with 14% survival observed (Table 2).

Butroxydim
In 17 samples tested, there were three samples found "developing" resistance (18% of samples tested) to butroxydim and one only sample herbicide-resistant with 38% plant survival (sample # 19). The overall survival to butroxydim was < 5% (Table 2).

Clethodim
Six samples were clethodim resistant, three were developing resistance and eight susceptible to clethodim. The overall plant survival to clethodim (250 ml) across 17 populations was 21% and a greater clethodim dosage (500 ml) re-sprayed on survivors resulted in moderately lower survival (Table 2). In one sample (sample #19) we observed 78% survival, but the increase of clethodim dosage proved to be ineffective with only a minor decrease in survival ~74% .Thus, an increase in clethodim dosage - an easy-to-adopt strategy – is likely to results in a moderate increase of herbicide efficacy. Most likely the effect of an increase in clethodim dosage will be negligible when the level of clethodim resistance is high.

Clethodim + Butroxydim
No sample exhibited resistance to the mixture clethodim + butroxydim (250 ml + 180 g commercial product). The sample with highest clethodim and butroxydim resistance (sample #19) exhibited 5% survival and therefore it was categorized as susceptible.

GROUP B

Sulfometuron
The great majority of samples (94 %) were resistant to the sulfonylurea sulfometuron with one sample categorized as "developing" resistance. Survival ranged from 9% to 100%. Six samples were multiple-resistant to sulfometuron and clethodim (38% samples tested). Multiple resistant populations to sulfometuron and clethodim exhibited a mean survival of 75% and 40%, respectively. Clethodim survival of sulfometuron survivors was on average 20% across all tested samples (Table 1).

Imazamox + Imazapyr
Similarly to sulfometuron the frequency of resistance to imazamox + imazapyr was high (88%). As expected, the overall survival to a full dose of imazamox + imazapyr was slightly lower than sulfometuron with 45% versus 69%, respectively. There was a high frequency of multiple resistance (multiple IMI + clethodim resistance found in 44% tested samples). Across all samples clethodim survival of imazamox + imazapyr survivors was 20% (Table 1).

GROUP L

Paraquat
There was no resistance found to paraquat. Only approximately 5% of plants survived the treatment with 1 L paraquat ha-1. Survivors were re-sprayed with 1 L paraquat ha-1 further reducing plant survival to 1%. Only two samples returned to 'develop' a minor level paraquat resistance with plants highly suppressed (Table 2).

GROUP M

Glyphosate
No resistance was observed to applied at the dose of 2 L ha-1. However, it is concerning the at the lowest recommended dose of 1 L there were four samples (24%) assessed as resistant, 65% as 'developing' resistance and 11% as susceptible. On average there was 16% survival across all tested samples after treatment with 1 L glyphosate ha-1. Careful progeny test will be conducted to confirm field resistance to glyphosate. Similarly, growers should carefully monitor plant survival after glyphosate treatments.

PRE-EMERGENCE
GROUP C

Atrazine
There was no resistance detected to atrazine.

GROUP D

Trifluralin
There was low level resistance to trifluralin with three samples categorized as 'developing resistance. In one sample the low "developing" resistance frequency was maintained at a high rate of 2L trifluralin ha-1 suggesting strong target-site resistance at relatively low frequency. The overall survival to 1L trifluralin ha-1 was 1% (Table 1).

Propyzamide
There was no resistance found in ryegrass populations to propyzamide confirming its important role for herbicide rotation. The maximum survival observed was 2% in sample #14.

GROUP J

Prosulfocarb
The majority of samples were found to be susceptible to prosulfocarb. Five samples (approx. 30%) were classified as 'developing' resistance. Careful monitoring is required to early-detect possible shift towards resistance to prosulfocarb which remains effective with mean survival < 5% across all tested samples.

Prosulfocarb + Trifluralin
All samples resulted susceptible to the mixture trifluralin + prosulfocarb. The maximum level of plant survival to this mixture was 4%.

GROUP K

Pyroxasulfone
All samples resulted susceptible to pyroxasulfone. Two samples were categorized as 'developing' resistance with a maximum level of plant survival of 15% and 10%, respectively. However, such a level of survival was not confirmed in a subsequent repeated experiment when the herbicide was applied directly on 'naked' seeds. In 2019 we will assess the seed progeny of these few samples to carefully monitor / confirm the evolution of resistance to pyroxasulfone in WA fields.

Pyroxasulfone + Trifluralin
All samples resulted susceptible to the mixture trifluralin + pyroxasulfone. No survival was detected across all tested samples.

Conclusion

The Australian Herbicide Resistance Initiative (AHRI) has conducted major geographical surveys in Western Australia to assess the level of herbicide resistance in major agricultural weeds including ryegrass and wild radish in 1998, 2003 and 2010 [1-4].

This focus farms study shows high levels of resistance to post herbicides [Group A FOP and Group B (Sus + IMIs)] and confirms the results of previous large random surveys in WA. There are significant levels of clethodim resistance in contrast to moderate level of resistance to butroxydim. The mixture clethodim + butroxydim is highly effective in reducing herbicide resistance – in the most clethodim- and butroxydim-resistant ryegrass sample plant survival to the clethodim + butroxydim mixture was below 5%. High level resistance to POST herbicides has been the driving factor for widespread adoption of PRE herbicides and harvest weed seed control to achieve effective ryegrass control.

Resistance to PRE herbicides remains low. Herbicide mixtures of PRE herbicides (Group D, J and K) are effective in controlling resistant ryegrass and should be adopted to reduce population size and risk of herbicide resistance. Annual ryegrass can easily evolve multiple resistance to D, J and K herbicides. A few field populations have been identified to be multiple-resistant to triflralin, prosulfocarb, triallate and pyroxasulfone 5-8.

High level adoption of harvest weed seed control should not decrease to achieve diversity of selection pressures on weeds, keep weed numbers low and complement effective control with PRE herbicides. AHRI will provide a service of herbicide resistance testing to support WA growers, encourage herbicide stewardship and help develop new herbicide solutions to control annual ryegrass and wild radish.

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GRDC Project Number: 9176079 FOCUS FARMS FIGHTING WEED FOES IN THE KWINANA WEST PORT ZONE

Table 1. Herbicide products, formulations, mixtures and dosages used to assess resistance levels in 17 populations of annual ryegrass (*Lolium rigidum*) collected in Western Australia in 2018 from cropped fields.

Herbicide	Product #	Group	Applied	Dose product	% survival (std dev)	% Cletho500 (std dev) ##	% A+B MR (std dev) ###	% Gly / Para1 L (std dev) ####
Butroxydim	Factor	A	POST	180 g	4.3 (8)			
Clethodim	Sequence	A	POST	250ml	19 (23)	7 (17)		
Clethodim + Butroxydim	Sequence + Factor	A	POST	250ml + 180g	0.7 (2)			
Diclofop	Diclofop 375	A	POST	1 L	67 (28)		14 (18)	
Imazamox + Imazapyr	Intervix	B	POST	750ml	43 (21)		20 (23)	
Sulfometuron	Oust	B	POST	20 g	68 (22)		20 (20)	
Paraquat	Gramoxone	L	POST	1 L fb 1L	1.3 (3)			5.3 (7)
Glyphosate	Round Up PowerMax	M	POST	2 L	1.6 (4)			16 (14)
Atrazine	Nutrazine	C	PRE	1.1 Kg	2.6 (3)			
Propyzamide	Dargo	D	PRE	1 L	0.1 (0)			
Prosulfocarb	Arcade	J	PRE	2.5 L	4.8 (3)			
Prosulfocarb + trifluralin	Arcade + Treflan	J + D	PRE	2.5 L + 1 L	0.4 (1)			
Pyroxasulfone	Sakura	K	PRE	118 g	0.5 (1)			
Pyroxasulfone + trifluralin	Sakura + Treflur X	K + D	PRE	118 g + 1 L	0.0 (0)			
Trifluralin	Treflur X	D	PRE	1 L	1.4 (3)			

 # Commercial brand names are provided however authors do not accept any responsibility for herbicide efficacy reported on L. rigidum plants and also emphasize there is no endorsement / conflict of interest for any particular commercial herbicide product listed here.

A higher dose of clethodim (500 ml) applied on surviving plants to 250 ml clethodim ha^{-1}

Survival to 250 ml clethodim ha^{-1} applied on plants surviving diclofop-methyl, imazamox+imazapyr (A+ B multiple resistance) or sulfomaturon (A+ B multiple resistance)

Plants surviving 1L glyphosate ha^{-1} or the first treatment with 1L paraquat ha^{-1}.

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CALENDAR OF EVENTS

Event	Date	Location
Women's Field Day	Thursday 20th June	Dalwallinu Recreation Centre
Post Seeding Field Walk	Wednesday 25th July	Main Trial Site, Watheroo
Spring Field Day	Thursday 12th September	Main Trial Site, Watheroo