



VOLUME 26 | ISSUE 2 | SEPTEMBER 2023

LIEBE GROUP NEWS



INSIDE THIS ISSUE

**NEW PROJECT ALERT!
RISKWISE**

**INOCULANT STRAINS FOR WA
GRAIN & PASTURE LEGUMES**

**SALARY PACKAGING & INCENTIVES
FOR REGIONAL EMPLOYEES**

The Liebe Group mission is to facilitate grower prioritised research, development and extension to support our members to be profitable and sustainable.

LIEBE GROUP PARTNERS

Liebe Group Partners are an integral facet of the success of the group. Since our inception the group has developed long and valuable relationships with 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.

These partnering organisations are high profile agribusinesses with a keen interest in the healthy future of agriculture. They see the relationship with the group as a meaningful way to stay in close contact with the grass roots innovators of the industry and a way to invest resources into a group which is focusing on research and development for future agricultural sustainability.

DIAMOND PARTNERS



GOLD PARTNERS



SILVER PARTNERS

Adama Australia

Australian Grain Technologies

Bayer

Boekemans Machinery

FMC

Summit Fertilizers

Intergrain

McIntosh & Son

Nufarm

Watheroo Minerals Group

Nutrien Ag Solutions

Refuel Australia

Syngenta

Spraytec Australia

Agrimaster

FROM THE EXECUTIVE OFFICER

LIEBE'S LEADERSHIP 2023

Welcome to the latest Liebe Quarterly newsletter. It has now been 12 months since we first started our Quarterly newsletter and the feedback so far has been all positive. We are always trying to improve what we do, so please get in contact if you would like to suggest ideas, topics or any general feedback.

In July we bid farewell to Aimee, who finished her year long career-break in Australia and has now returned home to Ireland. Aimee did a power of work during her short time with the Liebe Group overseeing the main trial site program and completing work on numerous projects. We also have welcomed Dania Dundon to the team as R&D Co-ordinator and after a 6 week handover period with Aimee, Daenia has hit the ground running and the group is full steam ahead for the second half of the year.

The Main Trial Site at the Carter's property is coming along, albeit in need of decent drink, like most place in the Northern Wheatbelt. Thank you to all those who turned out to our Spring Field Day this month. It was another great day and we appreciate all the feedback from the members regarding current on farm research ideas and issues.

In June we ran a Salinity 'Masterclass' at Mike, Colin & Pauline Pearse's property near Wubin. This event was held as part of a project to help a new generation of land managers continue on the work and knowledge that has been generated by previous generations when it comes to salinity management. The event was well

attended with more events planned for later in the year including a bus tour to Wongan Hills to visit an on farm desalination plant.

Aeneva, Daenia & I attended the Grower Group Alliance annual forum in July, which gave us all a good opportunity to network with other groups, researchers and industry personnel. I had the opportunity to present on our project "Agtech Decoded", providing some insights into the significant grower adoption of tech over the years and an update on our moisture probe and weather station network. If you haven't already, feel free to log in the network on the Liebe Group home page and have a look. The network fills a few gaps in the BOM/DPIRD network and is available for all Liebe members to view.

We are also please to be part of a new 5 year investment by GRDC, that is aiming to assist farmers better manage the risks involved with running a modern farming enterprise.

This national project, called 'Riskwi\$e' aims to be grass roots driven, with the ideas and concepts evolving as the project progresses. Our involvement is anchored by a long term rotational trial that is looking at the risks and rewards of fallow/legumes/brown manure and the different N strategies associated with these different rotations. Aeneva & I headed to Sydney last month for the launch of this project, and it was great hearing from the project team and other participants.

We wish everyone a safe harvest. We have one more newsletter planned for 2023 due for release in November.

BOARD

Chair: Brad McIlroy

Vice-Chair: Rebecca Wallis

Secretary: Chris O'Callaghan

Treasurer: Sophie Carlshausen

Board Members:

Boyd Carter

Dylan Hirsch

Wendy Sawyer

Emma Pearse

Blayn Carlshausen

Gavin Carter

Alex Keamy

FINANCE COMMITTEE

Chair: Wendy Sawyer

R&D COMMITTEE

Chair: Dylan Hirsch

WOMEN'S COMMITTEE

Chair: Amanda Nixon



Working together
in Agriculture



CONTENTS

MEMBER NEWS

	Page #
New Project Alert! RiskWi\$e	5
Impact of Stubble Height on WA Cropping Systems: 2022 Summary	6
Survey of Summer/Autumn Brassica Refuges for Diamondback Moth in the Western Region to Predict Early Season Risk of Infestation	7
Inoculant Strains for WA Grain and Pasture Legumes: On-Going Research by The Legume Rhizobium Sciences at Murdoch University	8
AgTech Decoded: What's Next?	10
Yield Prophet: 2022 Update and Refresher	11
Out and About in the Liebe Group Region	12
2023 Post Seeding Field Walk R&D Session Results	14

AGRONOMIC UPDATES

Making Better Use of Your Lime Budget	22
---------------------------------------	----

BUSINESS UPDATES

Should Local Wheat Prices be Trading at a Premium This Year?	15
Salary Packaging and Incentives for Regional Employees	16
Wind Farm Considerations	18

OTHER UPDATES

Powering Ahead at Latham	20
What's Next for WA's Aboriginal Cultural Heritage Legislation?	21
Agricultural Industry Fatality Report	24

NEW PROJECT ALERT! RISKWi\$E

By Chris O'Callaghan, Executive Officer, & Aeneva Poulish, Project Officer, Liebe Group



RiskWi\$e is a five year initiative that seeks to involve Australian grain growers in the identification of on-farm decisions that have unknown components of risk-reward.

This project aims to develop an improved understanding of the risk-reward relationships for on-farm management decisions while continuously advising growers of new insights into optimising rewards and managing risks. Additionally, this initiative will challenge grower decision-making so future management decisions are evaluated in terms of the probability of upside returns offset against the associated downside risks.

This project is a GRDC investment, led nationally by CSIRO with Grower Group Alliance (GGA) being the WA action research lead. The centrepiece of this project will see growers and their advisers quantifying the probabilities of uncertainty of outcomes and assessing the risk-reward payoffs for specific management decisions in the context of their own farming operations using a participatory action research methodology.

GRDC target outcome is that 80% of grain growers can articulate their production management decisions in terms of probability of upside returns (reward) offset against the associated downside risks.

RiskWi\$e comprises of five research themes; nitrogen decisions, sowing decisions, enterprise agronomic decisions, enterprise financial decisions, and managing natural resource capital.

The Liebe Group have designed and implemented a small plot trial to compare to cost-benefits, soil chemical and physiological characteristics between (i) continuous wheat, (ii) chemical fallow with stubble, (iii) legume crop and (iv) legume cover crop (worked into the soil as green manure).

We hypothesis that the benefits of the fallow, legume break crop, and legume green manure will differ between the years.

More details will be coming in the months ahead.

During fallow, grain growers forfeit production in one season in anticipation that there will be some level of compensation by increased crop production in the following season. There is also the aim to increase yield in subsequent years as well as improving N fixation when growing cover or break crops. However, the risk-benefits of fallow, cover and break crop management is not often well understood.



Images from top:

- RiskWi\$e trial being sown on Friday 19th May.
- Living Farm staff Giles Calvert and Andrew Wherrett with Liebe Group Project Officer Aeneva Poulish after the trial has been sown.
- Living Farm completing the first nitrogen application to RiskWi\$e trial.
- Aeneva & Chris with RiskWi\$e Project lead Lindsay Bell (CSIRO) and WA research group Lead Daniel Kidd (GGA) at the RiskWi\$e Launch Conference in Sydney.

RiskWi\$e
— the National Risk Management Initiative



IMPACT OF STUBBLE HEIGHT ON WA CROPPING SYSTEMS: 2022 SUMMARY



By Chris O’Callaghan, Executive Officer, Liebe Group

In 2021, the Liebe Group began a GRDC investment into the impact of Stubble Height on Cropping systems in WA. Collaborating with the Facey Group, Stirlings to Coast Farmers, Corrigin Farm Improvement Group, Farmanco, DPIRD and Charles Sturt University, these trials will be run over three growing seasons and will assess the “Strip & Disc” system against conventional stubble management systems.

Trials were set up at harvest in 2021, with 2022 being the first full season of data collection, with all groups collecting a large set of data on many aspects of the system, including stubble biomass, crop establishment, temperature, spray efficacy, crop nutrition, yield and quality. Below is a summary of some of the key findings.

Weed Control Challenges

Weed control presents a challenge for the Strip & Disc system, with the disparity between the harvest height required to use the stripper front and lower weed height, meaning harvest weed seed control may be difficult to achieve. In other parts of Australia, there has been some evidence to suggest that the increased stubble height, combined with narrow row spacing, can mean the weeds do grow taller seeking sunlight and thus are able to be captured for harvest weed seed management. At the sites studied through this project, the sites have been kept relatively clean, although the Wickepin and Kendenup sites did have some weeds. At each of these sites there was no significant difference in weed heights between the different stubble height treatments.

Further investigation into weed seed management will be pursued this harvest, with researchers from the University of Western Australia Centre for Engineering Innovation interested in working more closely with us to study this topic.

Harvest Results

Generally, the strip & disc system allows for greater efficiencies at seeding and harvest. Tables 1 & 2 below outline the harvest results from the Wickepin & Corrigin sites, which were both sown to wheat in 2022. At Wickepin the yield reduction from the Strip & Disc system was likely due to an increased weed burden in that treatment through poor pre-emergent herbicide efficacy. At both sites, the harvest speed was higher using the stripper front, fuel use was less using the stripper front at the Kendenup site and higher when windrowing for baling at the Wickepin site.

Table 1. 2022 Wheat harvest results from the Facey Group’s Wickepin site.

Treatment	Yield	Speed (km/h)	Fuel Use (l/hr)	Protein %	Screenings %
Strip + Disc	3.18	7.94	71.98	8.88	5.33
Draper + Tyne	4.11	6.14	69.81	8.9	3.88
Draper (Baled) + Tyne	3.94	6.77	83.85	8.83	4.11

Table 2. 2022 Wheat harvest results from Corrigin Farm Improvement Group’s Corrigin site.

** Note, this site was affected by the 2022 Corrigin Fires and all stubble was burnt. Thus the 2022 harvest was the treatment set up year.*

Treatment	Yield	Speed (km/h)	Fuel Use (l/hr)	Protein %	Screenings %
Strip + Disc	6.40	10.60	66.30	7.38	3.05
Draper + Tyne	6.50	5.60	85.00	7.15	3.36
Draper + Disc	6.60	7.70	71.80	7.50	4.69

Tables 3 & 4 show canola yield results from the Maya and Kendenup sites. The canola was all harvested with a draper front at both sites, with very little yield difference between treatments at Maya. At Kendenup there was a yield benefit in the Speed Tillage treatment, likely due to the amelioration effect on the non-wetting soil present at that site.

Table 3. 2022 Harvest Result from the Liebe Groups Maya site.

Treatment	Yield	Protein	Moisture	Oil
Draper + Tyne	2.45	20.83	4.40	46.35
Stripper + Disc	2.44	21.15	4.58	45.83
Stripper + Stubble Crunch + Tyne	2.59	20.60	4.43	46.45

Table 4. 2022 Canola Harvest Results from the Stirlings to Coast Groups Kendenup site.

Treatment	Yield	Protein	Oil
Draper (Standard Height) + Tyne	2.70	17.73	47.73
Stripper + Disc	3.14	18.07	47.67
Stripper + Speed Tiller + Disc	3.43	18.43	47.37
Draper (Cut High) + Disc	3.00	17.30	47.90

Summary

These trials continue in 2023, with the Corrigin & Wickepin site having been sown to wheat and the Kendenup site sown to canola. Also in 2023, additional measurements for temperature, humidity, soil moisture and nutrient tie-up will be taken to add value to the current data set.

Stay tuned to the Liebe newsletter, next quarter we will providing an update from four years of eastern states research into this topic.



FURTHER RESOURCES



GRDC Podcast

The most expensive herbicide is the one that doesn't work | April 2023



Factsheet

Improving pre-emergent herbicide spray coverage in stubble retentions systems | 2018

SURVEY OF THE SUMMER/AUTUMN BRASSICA REFUGES FOR DIAMONDBACK MOTH IN THE WESTERN REGION TO PREDICT EARLY SEASON RISK OF INFESTATION

By Christiaan Valentine, Research Scientist, DPIRD

The Liebe Group have joined forces with DPIRD, the Mingenew Irwin Group, West Midlands Group, Facey Group, and South East Agronomy Services to better understand the impact of a green bridge on subsequent Diamondback moth (DBM) populations.

Staff conducted green bridge surveys every March from 2020 to present and identified refuge brassica populations present on roadsides and in paddocks.

This surveillance has provided a foundation to assess the role of the brassica green bridge in pre-season DBM presence regionally.

Additionally, the results provided direction into the design of the next phase of surveillance which aims to relate pre-season DBM presence with canola crop colonisation timing and the potential for populations to increase above threshold levels.

We can compare this years (lack of) green bridge with the previous three years in regards to the rainfall distribution pattern over the WA grain belt (Fig 1). The 2020 and 2021 summer was above average and resulted in a widespread green bridge. The summers of 2022 and 2023 were below average with green bridges isolated to several pockets of the grain belt.

Sparse summer rainfall events reduced the number of refuge available for larvae detection and only 7 of the 425 sites surveyed in March were found to contain DBM larvae (Fig 2). This compared to 26 locations with larvae in 2020, 11 in 2021 (years with a wetter green bridge) and 3 in 2022 (dry green bridge).

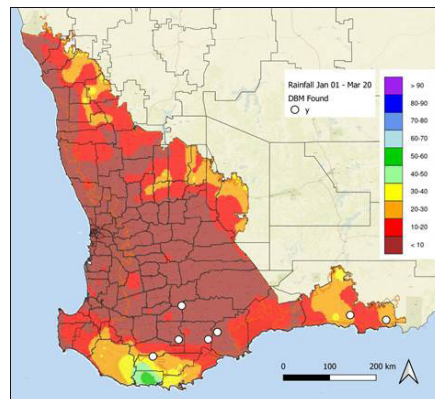


Figure 2. Map showing positive DBM larvae sites identified in March 2023. No further larvae were detected during April inspections.

It is important to recognise that our other major moth pest, Native Budworm, have different flight patterns to DBM and low DBM numbers do not necessarily correlate with low Budworm numbers. Currently (July 2023) we are seeing large numbers of budworm moths flying into the Northern Wheatbelt, and Native budworm are active early.

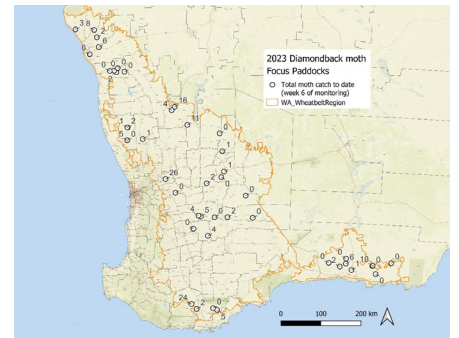
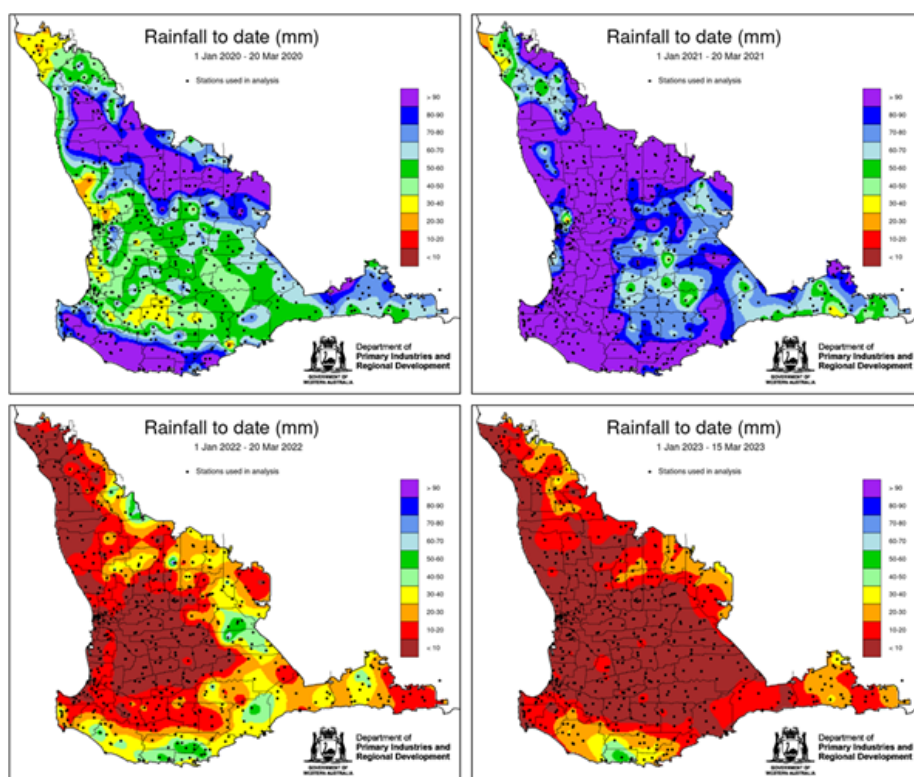


Figure 3. Location of Focus paddocks used for monitoring DBM numbers and moths found.

Acknowledgements

Funding for the Diamondback moth project is from DPIRD and GRDC, project DAW1905-010RTX

Technical support from DPIRD staff, the Liebe Group, West Midlands Group, Mingenew Irwin Group The Facey Group and South East Agronomy Services.



PestFacts WA
Diamondback moth numbers are low, but growers are reminded to monitor with warming temperatures



Figure 1. Rainfall distribution for January to March 2020 (top left), 2021 (top right), 2022 (bottom left) and 2023 (bottom right).

INOCULANT STRAINS FOR WA GRAIN AND PASTURE LEGUMES: ON-GOING RESEARCH BY THE LEGUME RHIZOBIUM SCIENCES AT MURDOCH UNIVERSITY

By Dr Yvette Hill, Research Fellow, Legume Rhizobium Sciences, Murdoch University

Legume Rhizobium Sciences (LRS) is Murdoch University’s dedicated centre for the science of rhizobia, nitrogen fixation and legumes. Established at Murdoch University in 1997, LRS is now the largest group of its kind in Australia and one of the largest in the world. With an emphasis on research outcomes that help growers, work focuses on understanding the basic biology of rhizobia-legume symbioses and their application in the field to improve productivity and sustainability. This includes research on new and existing legume cultivars and identifying superior elite inoculant rhizobia strains that are well adapted to Australian farming systems.

In a long-term research project funded by the GRDC, the National Fixation Project (NFP) drew together researchers from across Australia to address some of the key issues regarding inoculation techniques and strains as well as other constraints in growing pulses successfully. LRS members trialled new rhizobia strains for field pea, lentil and vetch (inoculant Group E) in the GRDC Western region, working in collaboration with scientists in the Southern region investigating faba bean (Group F) rhizobia. Commercially, the strain WSM1455 has been used for both Group E and Group F.

Through numerous national field trials, nodulation of field pea, lentils and vetch inoculated with new elite strain WSM4643 increased by 60% over the existing strain WSM1455, with a concomitant increase of 14% in N fixation (N fix kg/ha) and 20% in grain yield (t/ha) down to a soil pH 4.6Ca.

Cultivar testing also showed WSM4643 formed an effective symbiosis across cultivars of field pea (7 cultivars), lentil (10 cultivars), vetch (9 cultivars). Similarly, the southern section of the NFP succeeded in providing another

new elite rhizobia strain SRDI969 to replace the commercial strain WSM1455 for faba bean allowing improved nodulation down to pH 4.5Ca.

Both strains will be commercially available for the 2024 season, and used in conjunction with lime application, recent economic projections are predicting an increased national value of \$41.6 M annually resulting from their release.

Table 1. Measurements of average seed yield per plot (kg/ha) of field peas (*P. sativum*) inoculated with commercial group E/F (WSM1455) in comparison to WSM4643, acquired from site achieving significance (3 WA and 2 NSW trial sites).

Locations	pH CaCl ₂	Year	Treatment	Yield (kg/ha)	
Brookton, WA	4.9	2013	WSM1455	600	
			WSM4643	1053	
Katanning, WA	4.9	2016	WSM1455	2102	
			WSM4643	2312	
Muresk, WA	4.7	2021	WSM1455	723	
			WSM4643	1133	
Condoboli, NSW	4.8	2021	WSM1455	4953	
			WSM4643	5562	
Griffith, NSW	4.8	2021	WSM1455	3286	
			WSM4643	3618	
			Average	WSM1455	2333
			Average	WSM4643	2733

Recent work has also investigated alternative break crops such as chickpea in low pH soils. In Australia, no compatible indigenous rhizobia are capable of nodulating chickpea (*Cicer arietinum*), so *Mesorhizobium ciceri* CC1192 (Group N; isolated from Israel in the 1970s) was introduced as the commercial inoculant for this legume more than four decades ago.

Analysis by LRS of 705 chickpea rhizobia isolated from 49 sites across the WA wheatbelt and the Ord River scheme area, have revealed the presence of at least 200 novel strains that have taken up key symbiotic genetic material through transfer in the soils where CC1192 has been inoculated. This has resulted in previously non-symbiotic indigenous bacteria being able to nodulate and fix N on chickpea using the genes acquired from CC1192.

A number of these novel strains collected from acid soils have been assessed as potential superior locally adapted inoculants at Northam (pH 4.5Ca.) and Goomalling (pH 4.7Ca.) as well as at sites in South Australia and NSW for traits such as nodulation, saprophytic competence, N-fixation and yield with some promising indicators in early nodulation and potentially increased yield. More trials need to be conducted across a range of environmental conditions in the future.

While a number of these strains are being trialled in 2023 by different groups such as the Liebe Group, future work for chickpea entails further assessment of novel strains isolated from WA and other states. Projected work will look internationally to sites with historical chickpea cultivation in an effort to capture a wider genetic pool of strains than those assessed in the

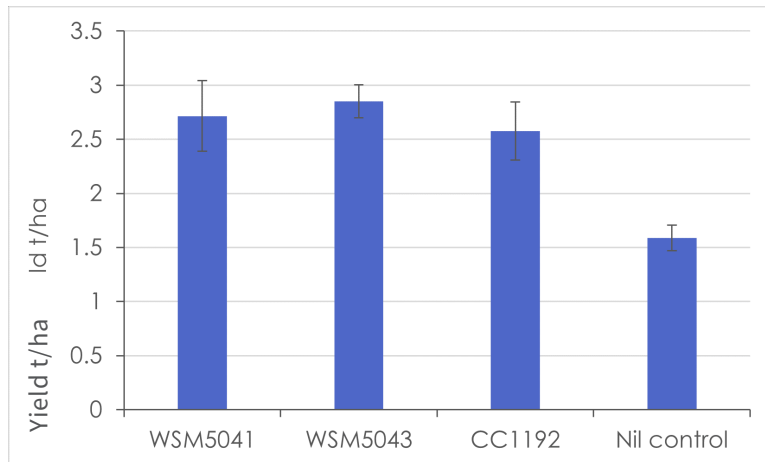


Figure 2: Average grain yield (t/ha) of chickpea (PBA Captain) treated with P-Pickle T® at Goomalling, Western Australia field site (2022) when inoculated with 3 rhizobial strains WSM5041, WSM5043 and CC1192 (commercial group N) and uninoculated controls. Treatments are shown with standard errors of the means (P ≤ 0.05).

1970's. This new germplasm may perform better than current Group N CC1192 in Australian systems.

All the rhizobial isolates obtained from ongoing research by the LRS on the various legume species is to be housed in the International Legume Inoculant Genebank (ILIG) at Murdoch University, under the custodianship of LRS. The ILIG currently holds 11, 558 strains of rhizobia from 778 legume species isolated from 100 countries, and is actively preserving Australia's rhizobial collections to benefit the Australian grains industry and provide the genetic material for future strain selection programs.

FURTHER READING



LIEBE LEGUME INOCULATION TRIAL SNAPSHOT

By Chris O'Callaghan, Executive Officer, Liebe Group

Sown	18/05/2023
Fertiliser	80 kg/ha Macropro Extra
Herbicides	1.5 L/ha Trifluralin, 1.1 kg/ha Simazine
Insecticides	100 ml/ha Bifenthrin, Chlorpyrifos
Treatment	Chickpeas
1	WSM5041 (Acid Tolerant peat 1)
2	WSM5043 (Acid Tolerant peat 2)
3	541B1 (Acid Tolerant peat 3)
4	Alosca Gp N
5	EziRhi Gp N
6	Nodulaid Gp N
7	Nil
	Faba Beans
8	Alosca Gp F
9	EziRhi Gp F
10	Nodulaid Gp F
11	Nil
	Lupins
12	Alosca Gp G
13	EziRhi Gp G
14	Nodulaid Gp G
15	Nil



Measurements to be taken: Plant establishment counts, nodulation scores, yield & quality.

AGTECH DECODED: WHAT'S NEXT?

By Aeneva Poulish, Project Officer, Liebe Group

Technology has always been at the forefront for Western Australian grain growers in the aim of increasing profitability, sustainability and efficiency.

Over the past 18 months, 14 Liebe Group members have invested in a network of moisture probes and weather stations to improve our understanding of soil water dynamics and water use efficiency.

The AgTech Decoded project commenced in June 2022 with the aim to explore the use and integration of this network to discover the tools required to improve farming practices.

This year has been purposed around data collection and analysis. The Liebe Group has teamed up with Stirling's to Coast Farmers and the data analytics team at CSIRO to increase grower awareness and build on the current knowledge of agricultural technologies.

Key findings from the on-farm surveys completed in January and the discussions around digital tools and data management at the workshops in March, identify that grower's embrace technology and are determine to try new concepts.

On average, Stirling's to Coast Farmers and growers in the Liebe Group region use up to seven different sources of digital technology.

It was found that weather information and climate forecasts were the most sought after, closely following by information regarding crop yield and soil moisture. However, data integration, data assimilation and data interpretation were often problematic in these two regions.

Over the past months, Liebe Group staff have been conducting case study discussions with host growers as an attempt to answer the question of what's next in AgTech?

Despite the rise in agricultural technologies, there is still an opportunity for more tools to be developed in this emerging industry sector.

Discussion from the workshops and case studies have revealed that growers are most interested in technology that is used to make critical management decisions such as crop planting, crop nutrition, soil amelioration, weed detection and management. Many of the existing technologies do not provide a clear value propositions.

“I want to put some real numbers to those gut feel decisions” (Dylan Hirsch, Liebe Group grower and R&D committee chair).

Although this may be a limitation, growers are willing to try technology to help identify there might be value to their business.

Technology has significantly improved in the last decade, providing a sign of hope that it will continue to develop in the coming years.

Growers put great amount of value and trust into these technologies, however results from the surveys and workshops identify that there is a lack of fulfilment from WA farmers.

It is crucial that agricultural technology companies continue to work closely with researchers and growers to develop the technology into a useful product.

Liebe Group has been provided an extension for the AgTech Decoded project until October 2023. This will allow for ample time to continue the discussions around the development in agricultural technologies in our region.

Ranking	Technologies Currently in Use
1	My John Deere (Operations Centre)
2	AgriMaster
3	CSBP Decipher / Summit Fertilizer App
4	AgWorld
5	SMS Basic or Advanced
6	AFS Connect/PLM (Case or New Holland)
7	PCT AgCloud
8	Xero
9	BackPaddock
10	AgriWebb

Figure 1. Results from survey question: “what farm management/technology apps are you currently using?”

Ranking	Key Challenges Identified
1	Interoperability - dealing with different platforms (machinery, software providers)
2	Time - just not enough hours in the day to do it
3	Machine setup & compatibility - getting my data in or out of machines
4	Value - is it financially worth doing it?
5	Experience - just not sure what is out there?
6	Support - not sure where to start or how things work?
7	Knowledge - I'm just not tech savvy enough

Figure 2. Results from survey question: “what are the key challenges identified with technology adoption/use?”

YIELD PROPHET: 2022 UPDATE & REFRESHER

By Aeneva Poulish, Project Officer, Liebe Group

Yield Prophet is an agricultural decision-support tool that generates crop production models based on nitrogen application, growing season rainfall, soil test results and historic climate data (taken from the nearest BOM weather station). The crop growth simulations assume a 'perfect' paddock (e.g. no disease, weeds or frost/heat events).

This is a useful tool for grain growers to understand the full potential of their soil types, and can assist with identifying yield gaps (the difference between potential yield and actual yield achieved).

Table 1: Yield Gap Analysis from 2022 Yield Prophet Crop Reports.

Model Timing	Average Decile	Modelled Nitrogen Limited Yield	Modelled Water Limited Yield	Probability
29 th June	3	1.7 t/ha	2.6 t/ha	76%
26 th July	3	2 t/ha	2.8 t/ha	70%
18 th August	4	2.4 t/ha	3.2 t/ha	84%
15 th September	6	2.7 t/ha	4.4 t/ha	100%
Actual Yield	2.7 t/ha			

Liebe Group conducted a yield gap analysis based on Yield Prophet reports that were generated in June, July, August and September of 2022. Table 1 demonstrates the yield data results based on the average sum of the 14 growers that are involved in the soil moisture probe network. With a combined actual yield of 2.7 t/ha, the modelled nitrogen limited yield results indicate that growers were meeting their target yield for the majority the growing season. The modelled water limited yield suggested that growers were on track to meet the predicted yield up until August, however a softer finish in September begs the question – was there some yield left out in the paddock in 2022?

Looking at Figure 1, the grain yield outcome model demonstrates that if the remainder of the growing season is as dry as the driest year on record, this crop would be expected to yield around 0.7t/ha.

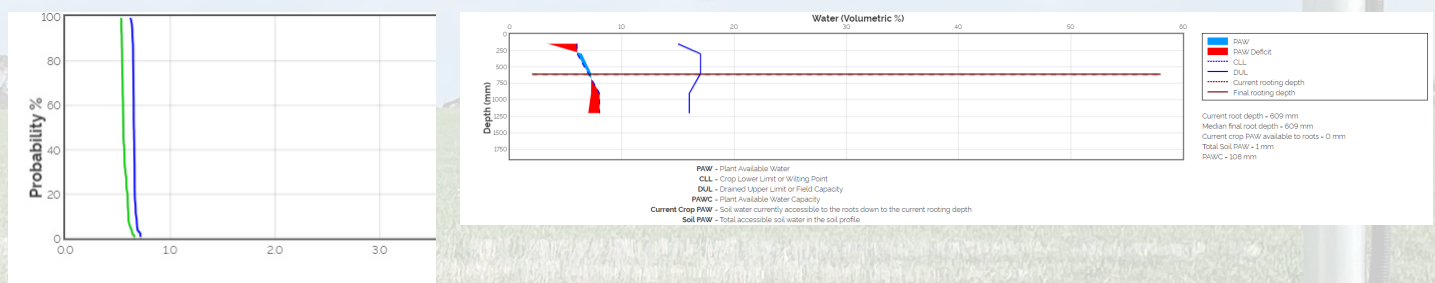


Figure 1 (left): Wheat grain yield outcomes chart generated in Yield Prophet on a Sandy Gravel as of the 9th August 2023 at Maya. The green line represents the nitrogen limited yield and the blue line represents the water limited yield.

Figure 2: Distribution of PAW on Sandy Gravel at Maya as of the 9th August 2023.

The soil characterisation is crucial for accuracy of the crop simulation model. This particularly refers to the Plant Available Water (PAW) capacity of the soil and the depth of soil (Figure 2). The Crop Lower Limit of the soil is the limit at which the crop cannot extract anything more from the soil, like the dampness of a sponge after it has been completely wrung out. The Drained Upper Limit is the saturation point, any water past this point indicates water-logging, just like a dripping sponge. Figure 2 is showing minimal moisture in the top 600mm but with very little in the subsoil, with crop rooting depth currently at 609mm which is its final rooting depth due to soil constraints.

Soil Moisture Probe and Weather Station Network (Wildeye Refresher)

- The Liebe Group weather station and soil probe network was established in 2021 with 14 growers participating. An additional 10 automatic rain gauges are also part of the network.
- Liebe members can access the network through the Wildeye app or webpage. Contact the Liebe office for details.
- Wildeye provided real-time data that allows growers to make better farm management decisions:
 - Rainfall (annual and GSR)
 - Wind speed and direction
 - Air temperature and relative humidity
 - Delta-T (preferred conditions for spraying)
 - Estimated fire danger index
 - Plant available water (profile and subsoil) and well as daily changes to PAW
 - Profile soil moisture %

This project forms part of the SW WA agricultural innovation hubs program which received funding from the Australian Governments Future Drought Fund.

Out and About

IN THE LIEBE GROUP REGION

June saw 150 regional women attend the 25th annual Women's Field Day at the Dalwallinu Recreation Centre.

Thank you to event sponsor Nutrien Ag Solutions for supporting our event.





← The **Salinity Masterclass** held in June helped local growers to better understand salinity management practices, sodic soils, and landscape hydrology.



← The **Post Seeding Field Walk** showcased the Jibberding Main Trial Site in July. Nearly 60 growers and industry representatives viewed trials and grower demonstrations over the afternoon before brainstorming R&D priorities for future planning.



Liebe Group Projects have been implemented and monitored over the last few months including the RiskWiSe Project, Carbon Trial, Stubble Height Project, Salinity Management and more.



2023 POST SEEDING FIELD WALK R&D SESSION RESULTS

By Chris O'Callaghan, Executive Officer, Liebe Group

Each year at the Post Seeding Field Walk, the Liebe R&D Committee probe our members to better understand the key farming issues so we can target future projects and field trials toward the highest priority issues our members are facing.

A recent example of this has been salinity management, which has re-emerged as an issue in some areas and a couple of years ago started to appear in our members R&D sessions. This led the group to pursue a State NRM-funded project that has revisited information developed 20 years ago and engaged a new generation of land managers into the space.

We thank the 50-odd people who participated in the session at this years Post Seeding Field Walk over a couple of beverages by the fire. It is something that each year we review how we go about it, to try and make it as painless as possible!

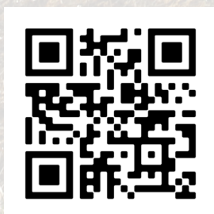
Some of the common issues that came up are listed below:

Topic	Issue/Idea	How we will address it
Canola	Poor establishment in low rainfall years.	Exploring collaborative opportunities with a GRDC-funded Canola Establishment Project for 2024.
Weed Control	Understanding the economics and use cases for new tech – ie Green on Green, Drone Spraying	Showcasing technology at the 2023 spring field day.
Soil Health	What amelioration options are right for which situation.	Planning an amelioration incorporation demonstration trial at the 2024 main trial site.
Farming Systems & Agronomy	Improving crop establishment, optimising seeding systems & pre emergent herbicides	Planning for a dye night pre-seeding 2024, looking at different seeding setups.
Cereals	Optimising performance of varieties on constrained soil ie marginal saltland, high Al soil etc.	Commenced scoping for constrained sites in 2024 near the Main Trial Site to test varieties.
Legumes	Growing legumes on acid soils	Continue work through current Legume Economics Project.
Crop Nutrition	Optimising nutrition. Better understand different application methods and nutrient recovery.	Continue to work with research partners to build and share knowledge. Revisit '23 trials in 2024 to see carry over effect.

These are just a few of the topics that came out of the brainstorm and at our most recent R&D Committee some actions and planning has been put in place to start addressing these. Of course, we can't do everything every year, however by regularly asking what the issues are, we can prioritise and provide the most high value activities for the year ahead.

We are also aware that not everyone thinks of their highest priority idea when put on the spot at an event – sometimes they come to you on the drive home! So we are opening up a place where members can quickly jot down an idea and it will go straight to the list of issues for discussion at the next R&D Committee meeting.

Scan the QR code below to submit an idea!



SHOULD LOCAL WHEAT PRICES BE TRADING AT A PREMIUM THIS YEAR?

By Dennis Voznesenski, Senior Analyst, RaboResearch



Rabobank

Moving into April this year, conditions were starting to look drier for many Australian crop farmers. Rabobank senior grains and oilseeds analyst Dennis Voznesenski said moisture which had accumulated from plentiful summer rains was starting to evaporate across parts of both the east and west coast, and weather forecasters were predicting drier conditions as far out as August induced by a likely El Nino.

“Northern New South Wales and southern Queensland saw considerable challenges with dry conditions right from the beginning of the year,” Mr Voznesenski said. “In north-western NSW, it became so dry farmers began cutting back planned planting, and around the town of Come By Chance, some farmers chose not to plant at all, surmising that it was not worthwhile risking the high input costs.”

Mr Voznesenski said up in the northern Western Australian cropping belt, rainfall has been very patchy since March. “While coastal areas in the Geraldton zone received average rainfall, further inland rainfall has been very poor, with some farmers cutting back planting by up to 20 per cent compared with expectations, and with the window for yield improvement closing very soon,” he said.

“With attention being primarily focused on the dry cropping areas in Australia – and with farmers restraining on selling as a consequence – this has led to local APW1 pricing trading at a premium to global levels.”

The Rabobank analyst said while it makes sense for prices in northern NSW and Queensland to trade at a premium in order to factor in the cost of drawing in grain from further south, there is – for now at least – less justification for local prices from central NSW downward to trade at any notable premium to global levels. “Crops in southern NSW, Victoria and South Australia are overall looking favourable – with too much rainfall becoming more of a problem than not enough in some areas,” he said.

“If we have another favourable year of Australian production, wheat prices should, in theory, trade at, or below, global levels,” Mr Voznesenski said. “The question becomes ‘when will that happen’. The answer will come from the farmer. For now, farmers are not selling ... and prices are being kept higher.”

Mr Voznesenski said at the other end of supply chains, international business for Australian grain appears to be drying up, with other cheaper origins becoming more appealing. “International demand will not yield to Australia’s high prices – with northern hemisphere harvest ramping up and exports continuing to flow from other countries, there are options other than Australia.

“So, if rains keep coming, when will farmers decide to sell? For now, the financial position of farmers remains very favourable following two to three good seasons – so likely not yet,” he said.

“If we do have a good season in Australia, local wheat prices will once again mainly be influenced by global factors. If we put aside the enigma that has become the Black Sea grain deal, the price outlook globally will depend on seasonal conditions in three regions: Canada, Argentina and Australia. If all three end the year in a dry condition, the global price outlook becomes bullish for wheat – and vice versa,” Mr Voznesenski said. “While, in addition, the impact of US weather conditions on the country’s corn production will also have a say in influencing overall grain price levels.”

To find out more about other Rabobank research, contact Rabobank’s local team in Moora and Dalwallinu on (08) 9690 8500 or subscribe to RaboResearch Food & Agribusiness Australia & New Zealand on your podcast app.



Dennis Voznesenski – Senior Analyst RaboResearch.



SALARY PACKAGING & INCENTIVES FOR REGIONAL EMPLOYEES

By Reagan Manns & Judy Snell, RSM Moora

Staffing present one of the biggest challenges to most businesses irrespective of size. Whether it is recruiting, training or retaining; it is one aspect of running a business that provides many business owners with sleepless nights.

It has been, and still is, incredibly difficult to find and retain appropriate staffing levels in regional areas to ensure the farming operations function adequately.

In addition to the challenges of competing with the resurgence of the mining industry and large salaries there is also the added challenge of housing and educational considerations which influence employees and their families when deciding on employment opportunities

To this end it is imperative that business owners are proactive in what they can offer to employees to entice or retain in the regional areas often regarded as salary packaging.

What is salary packaging?

It is an approved benefit that allows payment for certain items with pre-tax salary. The employee will pay less tax and keep more of the income.

It is usually built around a base salary and may comprise of many additional elements such as performance based incentives, non cash benefits, salary sacrificed super contributions, training and development opportunities or salary sacrificed annual leave entitlements.

By offering employees a range of options on how they are compensated for their labor it gives flexibility to suit their needs, risk profile and future goals.

The incentives may demand additional administrative or compliance for the employer however given the scarcity of quality workers in regional areas it is something the business needs to seriously consider to ensure they can successfully recruit and retain their staff.

Some of the non cash benefits – i.e. benefits outside of the base cash salary could be housing; motor vehicle; expenses reimbursement; discounted loans and entertainment. All of these are extremely attractive to the employee.

However, this isn't a free lunch.

The ATO as you can well imagine, do not look favourably upon these non-cash benefits as ultimately, they are the ones who are losing out.

Particularly in instances where the business is claiming a tax deduction for the expense it is purchasing for the employee (such as the fuel or tyres it has put on the employee's car).

As a disincentive for the employer the ATO have a separate piece of legislation known as Fringe Benefits Tax. It is calculated at the top marginal rate of 47% on the grossed up taxable value of the benefits provided.

Looking at a simple example, if you were to pay \$10,000 to help cover the education costs of an employee's child.

The FBT payable by the employer would be \$8,867.96. So, the total cost to the business would be \$18,867.96 and the employee would enjoy a \$10,000 benefit and the FBT which is paid by the employer not the employee.

However there are carveouts in this area as the ATO recognize the need for incentives to be provided for to encourage employees to work in rural and remote areas.

The exemptions are where the transactions has been minor or infrequent and also remote in area.

The ATO define through population census, this as at least 40km from a town of more than 14,000 and at least 100kms from a town of more than 130,000 people.

They are primarily focused on housing, travel and fuel / electricity. The level of reduction in FBT liability varies from complete exemptions for certain arrangements to a partial reduction in others. Unfortunately, the legislation is quite specific in the requirements that must be met to be entitled to the exemptions, so it is imperative that business owners seek appropriate advice to ensure that an arrangement they are entering into is eligible.

Another way to enhance your salary package is with a profit share component.

If structured right, this can be a major win-win for both the employee and business owner. However, they can be difficult to negotiate and costly to implement as they would require a lawyer to draft up two separate contracts.

Because of this, it is probably an option to be reserved for either long standing managers who you are wanting to secure for the long term, or, as an incentive to entice someone in (as a future part of their package after certain criteria are met).

There are a few considerations that need to be considered when negotiating such a package:

1. The obvious reduction in base salary
2. Loss of superannuation on the contingent income
3. Reduction in \$ value on leave entitlements
4. For the employee to be able to have their profit share entitlement paid into a company, there needs to be some level of risk / reward for the profit share component.

From the farmers perspective:

1. How many acres are to be used as a reference point for the profit share
2. How and who is calculating the profit/acre to be used

The benefit for the employee is twofold, firstly – there is a greater level of transparency and certainty over any potential contingent income (provided it rains!). But unlike a discretionary harvest bonus, at least the employee knows that there is a framework in place for them to reap rewards from a good year.

The second benefit is that if structured correctly, they can potentially reduce their marginal rate quite substantially by making use of the company tax rate.

As mentioned there are no free lunches, the ATO are very active in this area and the compliance complex so if offering any benefits or packaging it is important seek advice from your professional advisor or our office in Moora.





WIND FARM CONSIDERATIONS

By Katrina Kowald, Management Consultant, Farmanco

KEY POINTS

- Understand the potential project and the intentions of the business you are dealing with.
- Understand the project's impact on you and your business.
- Know that wind farms can take several years to enter the construction phase, if at all.

YOU'VE BEEN APPROACHED BY A WIND FARM COMPANY, WHAT DO YOU NEED TO CONSIDER?

With public opinion and government policy trending toward renewable energy, the industry has really started to ramp up in Western Australia. As a landholder, there are several factors you should consider if you are approached by a developer.

Table 1 on the next page, developed in conjunction with data from the Clean Energy Council, details the seven stages of a wind farm in Australia.

If you have been approached by a wind farm developer, or other renewable energy developer, here are some things you need to consider.

- How do you feel about having the technology on your property, possibly impacting the aesthetics of your property? If you are unsure or don't like the idea, how would you feel about missing out on the income opportunity while still being impacted by turbines on a neighbour's property?
- Don't always take the first offer that comes your way; if a developer is sniffing around, it probably means someone else is too. Investigate the different projects being scoped, find out if your neighbours have been approached and understand how the project as a whole will benefit/cost the community.
- Exclusivity Agreement — an exclusivity agreement isn't signing you up to have a wind turbine, it is signing you up to only talk to that developer for that period of time. You need to understand what you are signing up to. Will there be a caveat over the land? How long for? Payment per year?
- Do your due diligence on the business approaching you.
 - What is their reputation in

the industry?

- What projects have they completed (not just involved in)?
- How do the landholders on their previous projects feel about them?
- What are the expected project timeframes?
- How long do they plan to be involved with the project? Will they see it through to construction?
- Some companies may just be in the business of developing potential projects to on-sell to bigger corporations to develop, completely changing the dynamic of the business relationship.
- For many reasons, an exclusivity agreement does not guarantee that you will end up with a wind farm on your property. Reasons may include: the project not proceeding beyond feasibility stage, your land not being included in the final project due to reduction in scale, the project owners choosing not to involve you, or you as a landholder choosing to opt out.
- Once a project has enough suitable land to proceed through the detailed assessment stage, the developer will begin negotiations with landholders as to what the project will look like

in terms of turbines, ancillary infrastructure, and remuneration. This negotiation will result in an option contract for a certain number of years, with a full contract to take its place once the project enters construction phase. The option contract is needed to secure the land so that finance and planning approval can be finalised.

- What is the project creating energy for?
- How is it going to feed back into the grid?
- Does the success of the project rely on grid upgrades, or a new power demand?
- How does that impact you?
- In terms of the project design, what will be on your land?
- Will you still be involved in the project if it gets scaled down based on lower energy needs or improvement in turbine technology?
- How long will it take for the project to be in operation?
- Wind farm projects have a long lead time of five to seven years (or far longer), and who you start negotiating with may not be who you finish the project with.

- Avoid anything until you understand the project and talk to your neighbours. The secret squirrel mode of operation that some businesses like to operate under can damage relationships between friends and neighbours.

When it comes to renewable energy, as a landholder, you own what the developers need, the land to place their technology on. This means you have the power to make sure any agreement is in the best interest of you and your business. However, keep in mind, if you are too difficult to work with and your land isn't crucial to the project, the developer may choose not to work with you.

Things to consider:

- Access roads, gates, grids, laneways
- Biosecurity measures in place
- What other opportunities are there? Can you sell water or gravel to the project?
- What is the project's lifespan? What will end-of-project life look like?

In terms of payment options, landowners are typically paid a straight annual annuity – per turbine per year plus any extra infrastructure, however, other agreements can be negotiated to include a supply/profit share.

There are a lot of factors involved in a potential wind farm project. If a project is going to impact you and your business, make sure you get the best benefit you can, without being too greedy.

If you would like more information regarding who to talk to in this space, please contact one of the Farmanco Management Consultants.

Phase	Key Activities for Developer	Landholder involvement	Timeframe
Site Selection	<ul style="list-style-type: none"> • To ascertain the wind resource in the area (typically through a desktop assessment). Transmission: proximity, available capacity, cost and ease of connection. • To ascertain whether there are any critical impediments that would prevent development at the site. • To select a preliminary site boundary and negotiate with landowners. • To select a preferred development solution and to develop a preliminary indicative site design. 	<ul style="list-style-type: none"> • May be approached to sign exclusivity agreement with developer to prevent you from negotiating with other developers. 	<ul style="list-style-type: none"> • 6 months to 1 year
Project Feasibility	<ul style="list-style-type: none"> • To undertake high level desktop investigations into site constraints and regulatory/approval processes that will enable refinement of the development. • To gain a high-level understanding of the likely costs of the development. • To perform onsite wind monitoring. 	<ul style="list-style-type: none"> • Monitoring equipment may be placed on your land. 	<ul style="list-style-type: none"> • 1 to 3 years
Detailed Assessment	<ul style="list-style-type: none"> • To undertake detailed site-specific investigations to enable assessment of the project impacts and optimisation of the wind turbine layout. 	<ul style="list-style-type: none"> • Option contract signed at this time to secure land so planning approval and funding can be sought. 	<ul style="list-style-type: none"> • Combined with next stage, 1 to 4 years
Planning and Environmental Approval	<ul style="list-style-type: none"> • To prepare the documentation necessary for regulatory and community assessment of the project. • To undertake any necessary environmental referrals and primary development approval processes as required. 	<ul style="list-style-type: none"> • Finalising and agreeing to plan and contract with the project owner. • At this point, landholders with exclusivity agreements may be dropped from the project if their land is no longer required. 	
Construction	<ul style="list-style-type: none"> • To finalise the costs of the project and determine if the project is to proceed. • To finalise the design and produce construction drawings. • To prepare the required management plans in accordance with the conditions of approval prior to construction. • To obtain all pre-construction approvals and consents (i.e., building approval) • To undertake construction of the project as approved and in accordance with the endorsed management plans. • To monitor compliance with any relevant conditions of approval and management plans during the construction phase. 	<ul style="list-style-type: none"> • Development happening on-farm. • Disturbance to business as usual as turbines and ancillary equipment are installed. 	<ul style="list-style-type: none"> • 1 year
Operation	<ul style="list-style-type: none"> • To undertake the operation of the wind farm in accordance with any operational conditions of approval and management plans. • To monitor compliance with any conditions of approval and management plans relevant to operation. 	<ul style="list-style-type: none"> • Minimal disturbance to business as usual. 	<ul style="list-style-type: none"> • 15 to 35 years
Decommissioning	<ul style="list-style-type: none"> • To identify whether the site is to be redeveloped (following the above process from Section 3.2) or decommissioned. • To decommission and rehabilitate the site in accordance with any relevant condition of approval or management plan. • To monitor compliance with any conditions of approval and management plans relevant to decommissioning. 	<ul style="list-style-type: none"> • Depending on initial agreements, redevelopment should require renegotiation. 	

Table 1: The seven stages of a Wind Farm in Australia. Data source: Clean Energy Council.



POWERING AHEAD AT LATHAM

By Luke Sizer, Lead Corporate Affairs, CBH Group

CBH'S LATHAM SITE IS ONE OF FIVE SITES UNDERGOING A MAJOR SITE UPGRADE THIS YEAR, WHICH WILL RESULT IN IMPROVED SAFETY OUTCOMES AND EFFICIENCIES.



This year's upgrade will include:

- One new asphalt open bulkhead, converting the temporary gravel bulkhead built for the two previous record crops into a permanent 52,400 tonne storage;
- A new portable weighbridge;
- A refurbished sample hut, relocated to a more efficient location;
- A new amenities facility; and
- Supporting pavement and earthworks for the upgraded site.

Area 3 Manager Ben Ketteringham is excited the Latham expansion is underway.

"The benefits are all connected at Latham, resulting in a win for growers, employees and the network," Ben said.

"We'll be able to sample, weigh and receive more tonnes through the new site set up. With the old set-up, we were limited in how many tonnes we could weigh in and out, so the increased throughput at the weighbridge really helps."

"This will improve cycle times, especially in the morning, with the amount of space provided through the new marshal-sample-weigh area. On the flipside, this will also help with outloading, allowing us to line trucks up safely and load them when we ready."

It's hoped the improvements will give growers in the area another incentive to deliver more to Latham.

"By having more storage, we should be able to keep tonnes at the Latham site, rather than growers and contractors having to drive up the highway to McLevie or Perenjori," Ben said.

"It will increase safety in the area, enabling growers to deliver closer and reduce unnecessary longer truck trips."

CBH Project Delivery Manager Brad Ashworth said he was impressed with how efficiently the project was moving, with the sealing completed in late May and final finishing work now underway.

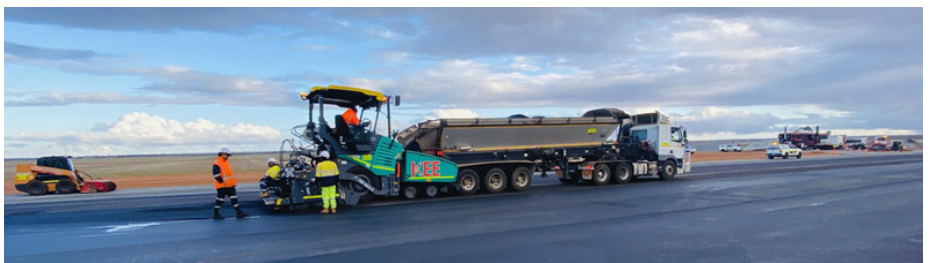
"Even with the rain delays – which is a normal part of building during winter – we are progressing really well and looking like we will complete the project on schedule in July," Brad said.

"Multiplant Holdings is our head contractor and, between their team and other contractors on site, they have done a great job moving the project along."

A bonus for this year's upgrade was Western Power provisioning permanent power at the Latham site.

"Now the CBH assets are supported by permanent power, improving resilience and performance of the new Latham site, reducing the need for generators," Brad said.

"This is a great example of the level of collaboration between CBH and Western Power. In addition, this installation was at no capital cost to CBH, which is a great outcome for all parties involved."



WHAT'S NEXT FOR WA'S ABORIGINAL CULTURAL HERITAGE LEGISLATION?

By Matilda Lloyd, Solicitor, Bailiwick Legal

On 1 July 2023 the Aboriginal Cultural Heritage Act 2021 (2021 Act) came into effect following five years of alleged stakeholder consultation and drafting. The new Act replaced the Aboriginal Heritage Act 1972 (1972 Act), which was deemed to be completely inadequate at providing recognition and protection for cultural heritage by the Joint Standing Committee on Northern Australia in *A Way Forward*, the Final report into the destruction of Indigenous heritage sites.

To improve these deficiencies the section 18 consent process under the 1972 Act was replaced with a four-tier management system for Aboriginal cultural heritage which required proponents to undertake a due diligence assessment prior to undertaking activities, including where ground was to be disturbed, for the purpose of determining whether there was any Aboriginal cultural heritage or risk of harm being caused to Aboriginal cultural heritage by those activities.

The four-tier system was also accompanied by a new definition of Aboriginal cultural heritage, a new Directory of information related to Aboriginal cultural heritage as well as harsher fines, stop activity orders, prohibition orders and remediation orders which were introduced as new compliance measures to prevent and remedy harm.

The objects of the 2021 Act were to recognise, protect, conserve, and preserve Aboriginal cultural heritage and to manage activities that may harm Aboriginal cultural heritage in a manner that provides clarity, confidence and certainty.

However, in the weeks up to and then following 1 July 2023, substantial concerns and uncertainty were raised about the 2021 Act

(and Regulations) together with a good dose of misinformation and in particular the impact that the new regime would have on freehold landowners and proponents who wanted to undertake their usual and normal (farming) activities on blocks of land greater than 1100m².

During this period Matilda Lloyd and Phil Brunner attended many seminars, in conjunction with WAFarmers, to explain to the agricultural industry and the broader community the new laws. We attended a WAFarmers Zone meetings and grower organised information sessions in Karridale, Busselton, Esperance, Katanning and Perth. Information was also provided in online workshops and information sessions for grower groups and agricultural consultants.

On 8 August 2023 the Premier, Roger Cook, announced that the 2021 Act (and Regulations) would be repealed and that the 1972 Act would be reintroduced with simple and effective amendments. The announcement is welcome news however the Government's rhetoric is that even the 1972 Act applies to freehold farmland. There is more work to be done to exclude freehold (improved) farmland from the operation of the 1972 Act.

Currently the 2021 Act remains in force and will be repealed once the Bill for the amended 1972 Act is passed by both houses of Parliament.

Bailiwick Legal extends its thanks to WAFarmers and the PGA for their efforts over the last two months. We will continue to work with WAFarmers and farmers to navigate the amended 1972 Act and press for further changes to the Aboriginal cultural heritage laws in WA.

If you would like more information about Aboriginal cultural heritage or how these changes may affect you and your business, please contact Bailiwick Legal on (08) 9321 5451 or by email at office@bailiwicklegal.com.au.

For further information about our legal services, please visit our website: <https://www.bailiwicklegal.com.au/>

The above information is a summary and overview of the matters discussed. This publication does not constitute legal advice and you should seek legal or other professional advice before acting or relying on any of the content.

MAKING BETTER USE OF YOUR LIME BUDGET

By Alisa Bryce and Wayne Pluske



Lime is a long-term investment, necessary to counter the ongoing acidification of agricultural soils. Although lime is often viewed as a variable cost it is better viewed as a capital expense – to maintain or improve a fixed asset (the soil) for future benefit.

Without lime, soil continues to acidify, eating away at yield potential and limiting rotations available to farmers. The costs compound because as the acidity yield gap increases so does the cost to close it. Lime is a necessary expense and is usually cash flow negative for the first few years, but a bit of reframing and budget management can make the investment more palatable to implement.

TREAT, MAINTAIN, DRAW DOWN

The ideal situation is to be in a liming maintenance phase (Figure 1). In the maintenance phase, soil pH is above the set targets to at least 30 cm depth. For many years now the industry has targeted a pH of at least 5.5 (CaCl₂) in the topsoil (0-10cm) over a subsurface of pH of at least 4.8, although many growers are now setting their standards higher (for example, 5.8 – 6.2 over 5.2 – 5.5).

When pH is in the maintenance range, lime applications are only needed to mitigate ongoing acidification. The maintenance phase is where pH is good to depth and only maintenance applications of lime (typically 1 – 2 t/

ha every 3 – 4 years) are needed to counter annual acidification caused by cropping and to ensure alkalinity continues to move down the profile to protect against subsoil acidity long-term.

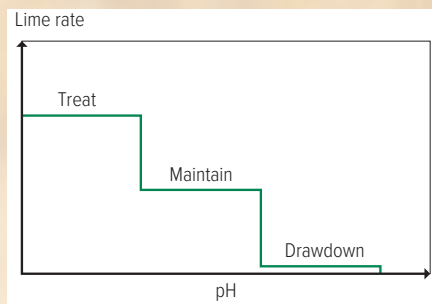


Figure 1. For soil pH we want the treat phase to become the maintenance phase. Once in the maintenance phase, avoid slipping back into the treat phase.

If the pH is well above the targets (typically inherently alkaline soils) the soil is in the drawdown phase and lime is not required unless pH levels creep down towards the minimum target levels.

When pH levels are below the targets, lime is needed to both decrease acidity (which in turn will increase yield) and to mitigate ongoing acidification (which will otherwise slowly erode yields further if adequate lime has not been applied). This ‘treat’ phase is the most expensive due to the high rates and costs of lime needed and the ongoing yield gap. In the treat phase, yield is penalised every season.

This treat, maintain, watch approach for lime is similar to how the fertiliser industry has long explained applications of fertiliser, especially phosphorus fertilisers. They have also used the terms “capital” and “build up” to explain fertiliser applications when in the treatment phase.

MOVING FROM TREAT TO MAINTAIN

Treating acidic soil and moving into a maintenance program requires higher rates of lime and more than likely incorporating lime to depth. Maintenance applications can be topdressed but because lime can take many years to move deeper into the soil, soil acidity needs to be ‘treated’ by putting the lime at depth where the acidity is.

This requires soil testing to at least 30 cm, in a minimum of 10 cm increments. Soil pH can vary in the top 10 cm so it is a good idea to check a few 0-5 cm and 5-10 cm samples to make sure that a 0-10 cm soil test is not masking a more acidic subsurface layer.

Figure 2 compares soil pH for three scenarios:

- Applying lime at 2 t/ha in year 1
- Applying lime at 6 t/ha in year 1
- Applying and incorporating 6 t/ha of lime to 20 cm

The data, derived from iLime scenarios, used a sandy earth soil with pH of 4.4 in 0-10 cm, 4.3 in 10-20 cm, and 4.2 in 20-30 cm.

2 t/ha was not enough lime to put soil pH in the maintenance phase. 6 t/ha moved the topsoil from treat to maintain, but 10-20 cm was still below the recommended minimum pH. Only incorporating lime moved the top 20 cm of soil from treat to maintain.

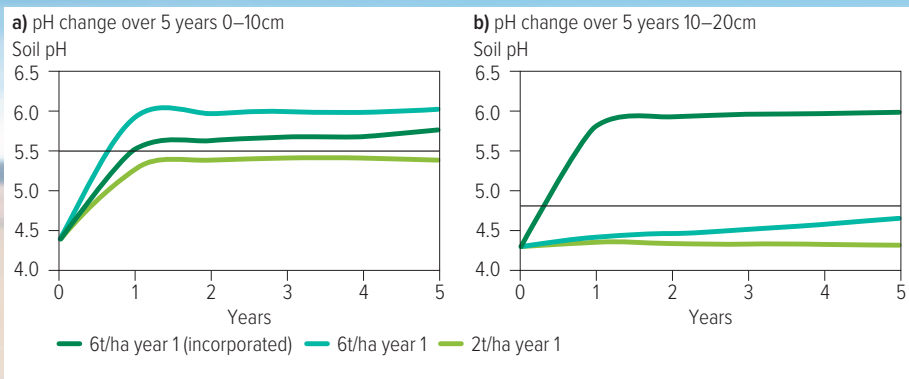


Figure 2. pH change over 5 years in a sandy earth soil in 0-10 cm (top) and 10-20 cm (bottom) using three different liming strategies (data from iLime). Targets for minimum pH are marked with a black line. pH below the black line is in the ‘treat’ phase; above the black line is in the ‘maintain’ phase.

ONLY USE THE VEGEMITE STRATEGY WHERE APPROPRIATE

Lime rates need to be high enough to treat acidity at all depths, not just the top 10 cm. The vegemite approach – a set amount of lime spread at low rates over a large area has little value. It does not treat the acidity, the yield gap remains, but the costs of lime application and spreading are still worn. Using the vegemite strategy in the treatment phase means staying in the treatment phase. The vegemite strategy is more appropriate in the maintenance zone.

MAKING BETTER USE OF THE LIME BUDGET

To get the most out of the lime budget, treat fewer hectares properly with higher lime rates and incorporate where necessary. Incorporation or strategic tillage often has co-benefits of removing other soil constraints such as compaction and mixing of water repellent topsoil and stratified nutrients.

Consider the following two scenarios (highlighted in the table to the right):

- Using the vegemite strategy with 2 t/ha over 2000 ha.
- Treating 300 ha by incorporating lime at 6 t/ha.

Ameliorating a smaller area properly (Scenario 2) costs less overall (\$164,400 vs \$305,600). The yield boost in the treated area will last for multiple seasons while other areas are ameliorated. Figure 3 compares yield for 5 years from these scenarios, using a back-to-back wheat rotation (data derived from iLime). The small yield boost from 2 t/ha has been lost by year 5.

Treating a smaller area properly increases the chances of a positive cash flow on the investment in the shortest timeframe.

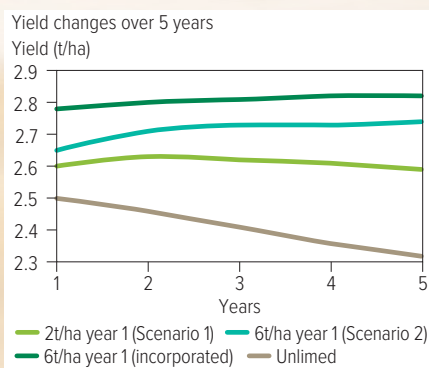


Figure 3. Yield changes over 5 years from three different liming strategies.

	Scenario 1	Scenario 2
Current yield (t/ha)	1.6	1.6
Area (ha)	2000	300
Lime rate (t/ha)	2	6
Total lime (t)	4000	1800
Lime cost (t/ha)	80	80
Total lime cost (\$)	320,000	144,000
Mixing cost (\$/ha)	-	140
Total mixing cost (\$)	-	42,000
Yield change (%)	1	10
Post lime yield (t/ha)	1.62	1.76
Yield change value (\$)	7.2	72
Yield benefit (\$)	14,400	21,600
Total cost (\$)	320,000	186,000
Cost minus yield benefit	305,600	164,400

DON'T SLIP BACK INTO THE RECOVERY PHASE

Maintenance applications are critical so acidity does not slip back into the treatment phase. When acidity builds up, hydrogen ions leach deeper causing subsurface and subsoil acidity which is more expensive to treat. Of course, if there are other soil limitations to root growth like ag-induced compaction (lighter soils) or high bulk density, structureless, blocky

TREAT OTHER ISSUES

soil (duplex and heavier soils) these need treating too. Treating acidic soil will only have a limited impact if other constraints continue to hinder root growth.

Reviewed by Steve Carr (Aglime of Australia) and Chris Gazey (DPIRD).

This article was produced as part of the GRDC ‘Maintain the longevity of soils constraints investments and increase grower adoption through extension – western region’ investment (PLT1909-001SAX). This project is extending practical findings to grain growers from the five-year Soil Constraints – West suite of projects, conducted by the Department of Primary Industries and Regional Development (DPIRD), with GRDC investment.



Republished from:
GRDC GoundCover Issue 165
July - August 2023, Western Region

AGRICULTURAL INDUSTRY FATALITY REPORT

WorkSafe Western Australia & Government of Western Australia Department of Mines, Industry Regulation and Safety | June 2023

Data notes

Information up until: 21 June 2023

Work-related traumatic injury fatality information used in this report is derived from information recorded and published by the Department of Mines, Industry Regulation and Safety (DMIRS) and relates to fatalities that result from a physical trauma or poisoning in Western Australia in accordance with the Work Health and Safety Act 2020, Occupational Safety and Health Act 1984, Energy Safety Act 2006, Electricity Act 1945, Gas Standards Act 1972, Mines Safety and Inspection Act 1994, Petroleum (Submerged Lands) Act 1982, Petroleum and Geothermal Energy Resources Act 1967 and the Petroleum Pipelines Act 1969.

In scope are workers, self-employed workers, volunteers and bystanders. Diseases and most disorders that would be seen as 'diseases', such as cancers and heart attacks, are out of scope. Other exclusions include self-inflicted injuries; Commonwealth Government workers; workers covered by Comcare; and defence personnel.

For completeness, included in the statistics are work-related fatalities covered by the Civil Aviation Act 1988 and Transport Safety Investigation Act 2003 under the respective jurisdictions of the Civil Aviation Safety Authority (CASA) and the Australian Transport Safety Bureau (ATSB); and where possible, those covered under the Australian Maritime Safety Authority Act 1990 under the jurisdiction of the Australian Maritime Safety Authority (AMSA). For more information see Recording of traumatic work-related fatalities by WorkSafe.

The industry classification codes are in accordance with the Australian and New Zealand Standard Industrial Classification (ANZSIC) published by the Australian Bureau of Statistics. The classification codes are based on a hierarchical structure consisting of one digit codes (broadest level) down to four digit codes (finest level). For more information visit www.abs.gov.au.

The occupation classification codes are in accordance with the Australian and New Zealand Standard Classification of Occupations (ANZSCO) published by the Australian Bureau of Statistics. The classification codes are based on a hierarchical structure consisting of one digit codes (broadest level) down to six digit codes (finest level). For more information visit www.abs.gov.au.

The injury and disease classification groupings and descriptions are standard terms taken from the National Occupational Health and Safety Commission publication: Type of Occurrence Classification System (TOOCS) Third Edition. For more information visit www.safeworkaustralia.gov.au.

Notes: Investigations into fatalities can be protracted and final decisions are often dependent on the release of information from other agencies. Accordingly, all information is subject to revision and thus, the work-related traumatic injury fatality figures for 2018-19, 2019-20, 2020-21, 2021-22 and 2022-23 are yet to be finalised.

Information relating to fatality investigations yet to be determined have been removed from this report as the information was considered to be immature, incomplete or incorrect. A summary of the investigations yet to be determined has been provided (Table 2).

The information is correct at the time of writing (as at 21 June 2023).

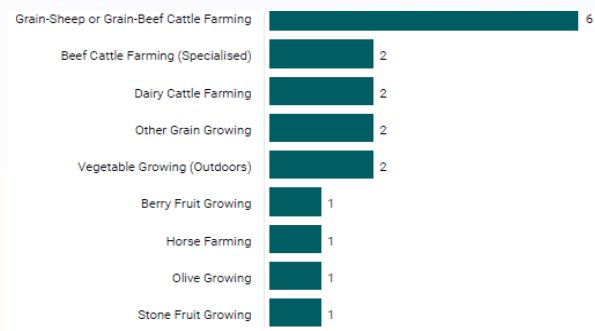


THERE WERE 18 WORK-RELATED TRAUMATIC INJURY FATALITIES IN THE AGRICULTURAL INDUSTRY.

Table 1. Work-related traumatic injury fatalities summary from 2019-20 to 2021-22.

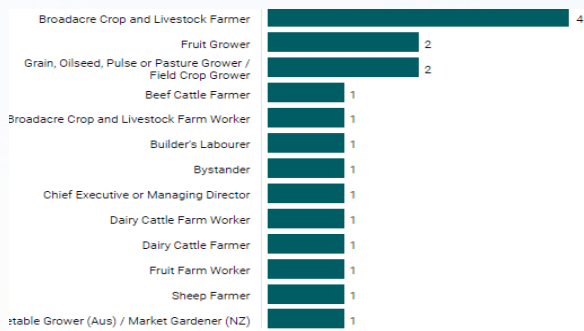
Financial Year	Region	Mechanism of incident subgroup	Breakdown agency of injury unit
Grain-Sheep or Grain-Beef Cattle Farming			
2019-20	Goldfields - Esperance	Falls from a height	Other and not specified ferrous and non-ferrous metal
2019-20	Wheatbelt	Vehicle incident	Other and not specified cars, station wagons, vans, utilities
2020-21	Wheatbelt	Vehicle incident	Motorcycles and sidecars, scooters
2021-22	Wheatbelt	Being trapped by moving machinery or equipment	Other and not specified power presses
2021-22	Wheatbelt	Vehicle incident	All terrain vehicle (ATV)
2021-22	Wheatbelt	Vehicle incident	Tractors, agricultural or otherwise
Beef Cattle Farming			
2019-20	Goldfields - Esperance	Being hit by moving objects	Other and not specified cars, station wagons, vans, utilities
2020-21	Wheatbelt	Being hit by moving objects	Tractors, agricultural or otherwise
Dairy Cattle Farming			
2019-20	Peel	Insect and spider bites and stings	Insects
2020-21	South West	Unspecified mechanisms of incident	Agency not known
Other Grain Growing			
2021-22	Wheatbelt	Being hit by moving objects	Tractors, agricultural or otherwise
2021-22	Wheatbelt	Falls from a height	Other and not specified material handling hoists
Vegetable Growing			
2020-21	Perth Metro	Being hit by moving objects	Tractors, agricultural or otherwise
2021-22	Mid West	Being hit by moving objects	Tractors, agricultural or otherwise
Berry Fruit Growing			
2020-21	Perth Metro	Being trapped by moving machinery or equipment	Tractors, agricultural or otherwise
Horse Farming			
2019-20	Great Southern	Rollover	All terrain vehicle (ATV)
Olive Growing			
2021-22	South West	Vehicle incident	All terrain vehicle (ATV)
Stone Fruit Growing			
2021-22	South West	Being trapped between stationary and moving objects	Front-end loaders, log handling plant, other loading plant

GRAIN-SHEEP OR GRAIN-BEEF CATTLE FARMING RECORDS THE MOST FATALITIES



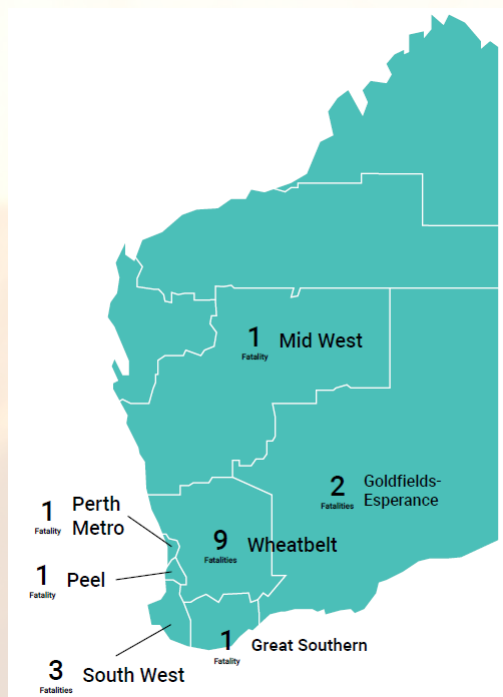
Work-related fatalities by ANZSIC Industry class of workplace, 2019-20 to 2021-22.

MIXED CROP AND LIVESTOCK FARMER WORKERS RECORD THE MOST FATALITIES



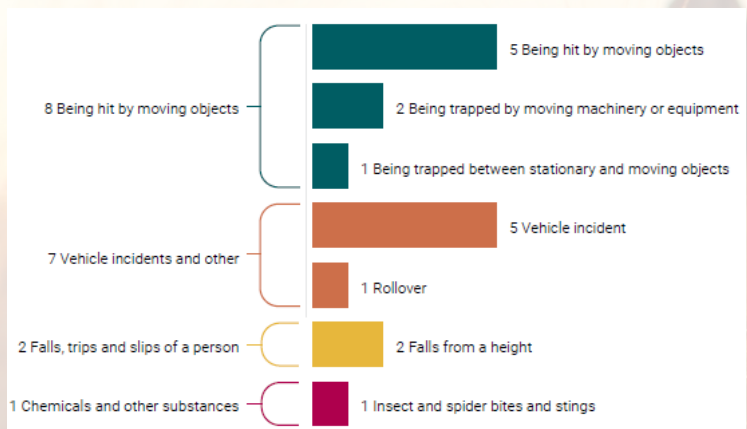
Work-related fatalities by ANZSCO Occupations, 2019-20 to 2021-22.

THE WHEATBELT REGION RECORDS THE MOST FATALITIES



Work-related traumatic injury fatalities by region from 2019-20 to 2021-22.

MOST FATALITIES INVOLVE BEING HIT BY MOVING OBJECTS



Work-related fatalities by mechanism major groups and subgroups, 2019-20 to 2021-22.

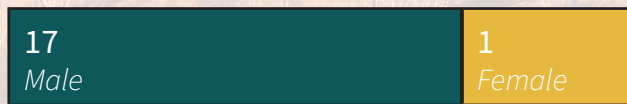
Note 1: One work-related fatality's mechanism was recorded as unspecified.
 Note 2: For fatalities involving a vehicle, Being hit by moving objects is recorded when a person not travelling in a vehicle is injured as a result of being struck by a vehicle or striking against a vehicle. Vehicle incidents and other is recorded when a person travelling in a vehicle is injured as a result of the vehicle's movement.

VEHICLES ARE INVOLVED IN MOST OF THE FATALITIES

Table 2. Work-related fatalities by mechanism subgroup and breakdown agency class, 2019–20 to 2021–22.

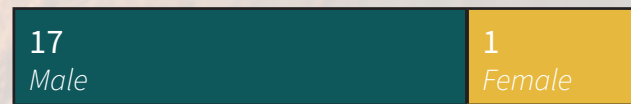
Mechanism of incident subgroup	Breakdown agency of injury unit	Number of fatalities
Being hit by moving objects	Tractors, agricultural or otherwise	42
Vehicle incident	All terrain vehicle (ATV)	1
Being trapped by moving machinery or equipment	Power presses	1
Falls from a height	Power hoists	1
Being trapped between stationary and moving objects	Front-end loaders, log handling plant, other loading plant	1
Being trapped by moving machinery or equipment	Tractors, agricultural or otherwise	1
Vehicle incident	Tractors, agricultural or otherwise	1
Being hit by moving objects	Cars, station wagons, vans, utilities	1
Vehicle incident	Cars, station wagons, vans, utilities	1
Vehicle incident	Motorcycles and sidecars, scooters	1
Rollover	All terrain vehicle (ATV)	1
Falls from a height	Ferrous and non-ferrous metal	1
Insect and spider bites and stings	Insects	1
Unspecified mechanisms of incident	Agency not known	1

ONE BYSTANDER WAS FATALY INJURED



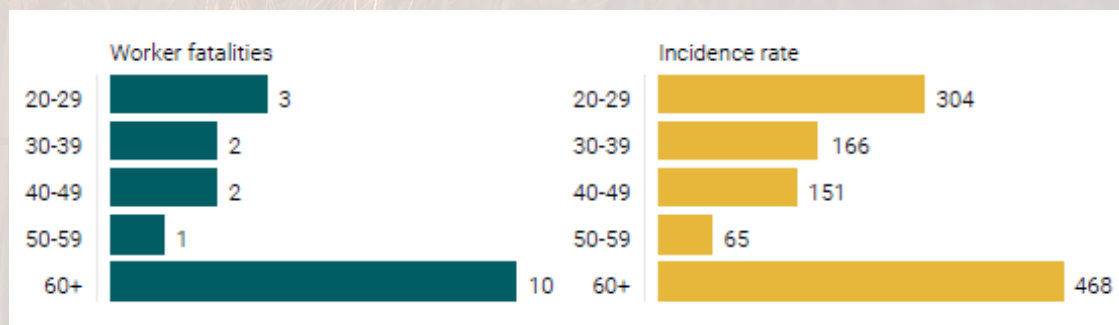
Work-related traumatic injury worker fatalities by employment type, 2019–20 to 2021–22.

MALES ARE OVER-REPRESENTED IN FATALITIES



Work-related traumatic injury fatalities, by gender, 2019–20 to 2021–22.

MOST FATALY INJURED WORKERS ARE OVER 60 YEARS OLD



Work-related traumatic injury fatalities and incidence rate (work-related fatalities per million workers), by age group, 2019–20 to 2021–22.

LIEBE GROUP TEAM

Executive Officer

Chris O'Callaghan
0429 446 515
chris@liebegroup.org.au

Administration & Communications Officer

Danielle Hipwell
(08) 9661 1907
admin@liebegroup.org.au

Research & Development Coordinator

Daenia Dundon
0448 476 925
research@liebegroup.org.au

Administration Assistant

Lisa-May Shaw
(08) 9661 1907
office@liebegroup.org.au

Finance Manager

Sophie Carlshausen
sophie@liebegroup.org.au

Development & Support Officer

Rebecca Wallis
0400 681 054
rebeccawallis01@gmail.com

Projects Officer

Lizzie King
0428 193 472
lizzie@liebegroup.org.au

Projects Officer

Aeneva Poulish
(08) 9661 1907
projects@liebegroup.org.au

CONTACT US

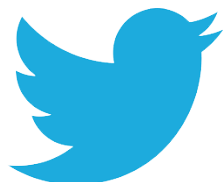
Liebe Group

17 Johnston St
PO Box 340, Dalwallinu WA 6609
(08) 9661 1907

www.liebegroup.org.au



[LiebeGroup](https://www.facebook.com/LiebeGroup)



[LiebeGroup](https://twitter.com/LiebeGroup)



[liebegroup](https://www.instagram.com/liebegroup)



On the cover: Over 150 growers and industry representatives attended the 2023 Spring Field Day at Jibberding.

Views expressed are not necessarily those of the Liebe Group staff, Board or members.

Disclaimer: Mention of trade names does not imply endorsement or preference of any company's product by the Liebe Group, and any omission of trade names is unintentional. Farmer experience may not work for all.