



WA Farm Data Sharing

This Food Agility CRC project set out to show how growers can safely share their own farm data and get useful decision-support information back in return.

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Department of
Primary Industries and
Regional Development



**GROWER
GROUP
ALLIANCE**
Together we grow



Curtin University

Food Agility Cooperative Research Centre Project No. FA099

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The project team acknowledges the WA grain growers, grower groups and advisers who contributed time, data and feedback to the WA Farm Data Sharing project. Their contribution helped shape the data sharing agreements, liming optimization reports, dashboard development.

The project team also acknowledges the technical and extension contributions of DPIRD, Grower Group Alliance, AxisTech, Curtin University and Food Agility CRC. The project drew on DPIRD soil acidity expertise and the iLime/Optlime modelling foundations, as well as farmer engagement and co-design activities led through grower networks.

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PROJECT DESCRIPTION

WA Farm Data Sharing was set up to show that growers can share their farm data safely and get something useful back from it.

The first test case was whole-farm lime planning. This was chosen because soil acidity is a serious and costly issue for many grain growers in Western Australia, and lime decisions are not simple. Growers need to think about soil pH, paddock variation, lime costs, freight, timing, crop response and long-term returns. The project brought together secure data sharing through DPIRD's Extrata platform, the 'LEAP' modelling framework, and grower-ready reports and dashboards. The aim was to take farm data, run whole-farm lime scenarios, and return the results in a format that growers and advisers could actually use.

The project delivered a working example of this process: farm data was transferred securely, analysed through LEAP, and turned into liming strategy reports and dashboard outputs for growers.

The same approach could also be used in future for other farm decisions, such as soil amelioration, crop rotations, nutrient management, machinery investment, insurance, lending and farm valuation.

Lean Canvas Summary

Canvas area	Summary
End users	Western Australian grain farmers, particularly growers managing soil acidity and long-term lime investment decisions. Early adopters were sourced through grower group networks.
Problem	Growers need to make expensive lime planning decisions but often do not have integrated information across soil, yield, crop sequence, lime costs, freight and price risk.
Solution	A secure farm-data sharing workflow and whole-farm LEAP model that ingests farm data, runs liming scenarios, and returns reports and dashboard-ready outputs through trusted platforms.
Unique value proposition	Use growers' existing data to provide tailored, whole-farm liming forecasts, including best-case, worst-case and most likely financial and soil outcomes.
Key results tracked	Seven farmers actively sharing data through the tool; seven reports delivered through dashboard and hard copies; one service provider connected; early adopter community of approximately 15-20 growers developed.

PROJECT PARTNERS

This project was a partnership between Food Agility CRC, the Department of Primary Industries and Regional Development Western Australia (DPIRD), Grower Group Alliance (GGA), AxisTech and Curtin University.

Partner	Role in the project
Food Agility CRC 	Innovation Partner: Food Agility makes innovation easier. We broker, design and deliver innovation programs for the Australian agrifood industry, ensuring maximum impact for investment. We specialise in using data and digital technology to increase profits and improve sustainability. We have a strong track record, with a \$400m+ portfolio that includes discrete, agile research projects through to major initiatives of national and global significance. Our team, board and network of 117 project partners span the agrifood, technology, research and government sectors.
WA Department of Primary Industries and Regional Development  Department of Primary Industries and Regional Development	Research Partner: The Department of Primary Industries and Regional Development (DPIRD) is the Western Australian government agency responsible for supporting primary industries and regional economies. DPIRD's mandate brings together agriculture, food, fisheries, and regional development under a single framework to ensure coordinated policy, regulation, and research. DPIRD's mission is to grow, protect, innovate. Grow covers the efforts to expand and diversify agriculture, aquaculture, and food industries, alongside broader regional economic development. Protect covers DPIRD's

	statutory responsibilities to biosecurity, pest and disease control, natural resource stewardship, and fisheries management, ensuring that industry growth does not compromise environmental or community resilience. Innovate reflects DPIRD's role in applied science and technology, using research facilities and field stations to develop and extend new knowledge across crops, livestock, aquaculture, and climate adaptation.
Grower Group Alliance 	Industry/grower engagement partner: GGA played a central role in stakeholder engagement, communication and extension and supporting role in project management. Drawing on its established relationships with grower groups across Western Australia, GGA facilitated collaboration between growers, researchers, government and industry partners, ensuring the project remained grounded in grower priorities while supporting adoption of emerging digital technologies.
AxisTech 	Technology partner: Technology partner; supported farm data digitisation and onboarding through AxisStream and returned LEAP outputs to growers through dashboard/visualisation workflows.
Curtin University 	Research partner: contributed towards grower feedback on usage of the tool and analytical expertise.

EXECUTIVE SUMMARY

Overview

This report summarises the WA Farm Data Sharing project, FA099.

The project set out to show how growers can safely share their own farm data and get useful decision-support information back in return. Whole-farm lime planning was used as the first test case because soil acidity is a major issue across the Western Australian grainbelt. Liming is also a big investment. Decisions depend on many things, including paddock conditions, soil pH at different depths, lime source, freight cost, seasonal conditions and likely crop response. The project brought together Food Agility CRC, DPIRD, Grower Group Alliance, AxisTech and Curtin University. Together, the project team tested a secure data-sharing process and developed the LEAP modelling framework. LEAP connects grower farm records, DPIRD's Extrata data-sharing platform, the iLime modelling base and grower-facing reports and dashboards. The LEAP concept represents a leap forward in farm decision-making, moving beyond incremental or "step-change" improvements. The frog-leap concept reflects the tool's ability to help growers move directly from complex paddock and soil data to practical, whole-farm lime investment decisions rather than single paddock decisions. It also represents agility, adaptation and smarter decision-making, providing a distinctive visual identity for the LEAP platform compared to other paddock scale decision tools.

Why the research is important

Farmers are collecting more data than ever through soil tests, machinery, farm software, yield records and adviser reports. But much of this data sits in different places and is not easy to bring together for whole-farm decisions. Growers are also careful about sharing their data, and rightly so. Farm data is commercially sensitive. Growers need to know who can access it, how it will be used, and what value they will get back.

Soil acidity was a good practical test case because lime decisions are not simple. Growers need to work out which paddocks to treat first, how much lime to apply, whether incorporation is worth doing, when lime may need to be reapplied, and what the likely long-term impact will be on soil condition and cashflow.

These questions cannot be answered well with generic advice alone. They need farm-specific data, including paddock history, soil pH at depth, crop sequence, costs and the grower's attitude to risk.

Aims and methodology

The project aimed to test whether growers would engage with a secure data-sharing process, and whether their data could be turned into useful whole-farm decision support.

The project involved recruiting growers, setting up data-sharing agreements, digitising farm data, transferring data securely, developing the LEAP model, designing reports and dashboards, and collecting feedback from growers.

WA soil acidity maps were used to help identify growers likely to have real soil acidity issues. Interviews and workshops were then used to understand how growers make liming decisions, what data they already have, what problems they face, and what they would want to see in a dashboard.

The technical work focused on building LEAP as a modular, containerised modelling framework. LEAP prepares grower data, checks inputs, fills gaps where needed using clear assumptions, runs Monte Carlo simulations, and calls the iLime API. This allows the existing iLime model to move from single-paddock use to whole-farm analysis across many paddocks, soil profiles, crop rotations, lime strategies, price assumptions and yield outcomes.

iLime implements the Optlime spreadsheet model in an easy-to-use app while Optlime simulate the changes in soil pH and exchangeable toxic aluminium across different soil layers and return on investment based on expected crop and pasture yield responses at single point in paddock.

Use by the technology partner

AxisTech helped digitise and structure farm data, connect growers through AxisStream, and develop dashboard and visualisation options for returning LEAP outputs to growers.

The project showed that a technology partner can provide the grower-facing system, while the science, modelling and secure data exchange sit behind it through DPIRD systems and APIs.

This is important because it shows how research models can move beyond manual analysis and become part of a more automated, usable workflow. It also showed that technology partners need to be involved early, because data structure, grower onboarding, dashboard design and links to existing farm systems all affect whether growers will use the tool.

Key results and insights

- The project demonstrated a working end-to-end process. Grower data was onboarded through AxisTech/AxisStream, transferred securely through Extrata, analysed through LEAP and the iLime API, and returned through grower-facing reports and dashboards.
- LEAP developed into a documented, containerised and deployable modelling framework. It can run whole-farm liming scenarios and produce outputs for soil pH, exchangeable aluminium, yield, cashflow and cumulative cashflow over a 20-year period.
- Seven growers shared data through the tool, and seven reports were delivered through dashboard and hard-copy workflows. This showed that growers are willing to share data when the purpose is clear, the process is trusted, and they can see value in the results.

- Grower interviews showed that lime decisions are practical, financial and local. Growers need paddock and zone-level information that considers soil pH depth, aluminium risk, lime rates, freight, lime quality, timing, incorporation and how the recommendation can actually be implemented.
- Dashboard design workshops showed that growers value spatial, visual and simple decision support.
- The project confirmed that trust, timing and relevance are central to farmer engagement. Recruitment and data collection were more difficult during busy farm periods and were most effective when supported by trusted grower networks and clear explanations of the value returned to growers.

Who benefits and how

The main beneficiaries are WA grain growers and their advisers. Growers benefit by getting clearer paddock-level information about where lime is needed, which strategies are likely to improve soil condition, when lime may need to be reapplied, and how different options may affect long-term financial outcomes. Advisers benefit because the reports and dashboards give them clearer information to discuss with growers.

The wider grains industry benefits because the project tested a data-sharing and modelling approach that could be used for other decisions, not just lime. This could include soil amelioration, nutrient management, crop rotation, machinery investment, lending, insurance and farm valuation.

DPIRD and research partners benefit from reusable software, stronger digital agriculture capability, and a clearer pathway for turning research models into tools growers can use. Technology partners benefit from a practical example of how research outputs can be linked into farm management platforms while still protecting grower control and trust

Recommendations

- Continue testing LEAP outputs with growers and advisers through one-on-one review sessions. This will help check whether the reports, dashboards and recommendations are clear, useful and trusted.
- Maintain grower control as a central design principle through clear data-sharing agreements, permission-based access, transparent assumptions and defined data retention and deletion arrangements.
- Growers need confidence that their data is being used for an agreed purpose, transferred securely, and returned to them in a form that creates clear value.
- Use the LEAP architecture as a reusable model for future high-value whole-farm decisions where trusted data exchange, science-backed modelling and grower-facing dashboards can create practical value.
- Investigate the use of the dashboard by farmer advisers (consultants, agronomist, resellers (CSBP & Summit), another service they can offer their clients.

INDUSTRY IMPACT METRICS

Development of data-driven decision support tools	1 tool IP created	Use real farm datasets to build and validate LEAP tool that provide actionable insights for lime optimisation. Also established that data can flow electronically to decisions making tool and getting results in real time. Through this platform 7 farmers provided their digital farm data and get lime optimization strategies. Reports were delivered to farmers through API/dashboard workflow which shows that data can be translated into practical grower-facing decision outputs.
Secure and scalable data-sharing frameworks	7 growers	Implemented privacy-preserving platforms (e.g., Extrata) that allow farmers to share data securely while maintaining ownership and control, enabling broader system-level analysis. 7 grower actively shared data through the tool which validate that willingness to share data when there is clear value, governance and a trusted transfer workflow.
Partnership ecosystem building across government, research and industry	1 Private technology provider	Project brought public and private partners like DPIRD GGA and Axistech together on one platform. Technology provider Axistech connected to the Extrata pathway to demonstrate that farm management platforms can participate in the data exchange and return outputs to growers. Axistech translated complex modelling outputs into user-friendly tools (dashboards) that support practical, on-ground decision-making.

IMPACT STATEMENTS

Industry partner - Grower Group Alliance

Alison Lacey, Project Manager Grower Group Alliance, Perth, WA

In 2020, the Grower Group Alliance (GGA) identified agricultural technology (AgTech) as a priority area following strong interest from its member grower groups and producers. To better understand industry needs, GGA conducted surveys and facilitated four virtual workshops to identify knowledge gaps, challenges, and research and development priorities. Discussion topics ranged from digital connectivity and AgTech adoption through to data-driven supply chains.

AgTech emerged as the highest priority across three regions and the second-highest priority in the fourth. Three key priority areas were identified:

1. Connectivity
2. AgTech solutions
3. Data sharing

Across all workshops, participants consistently highlighted a range of challenges, including fragmented data stored across multiple platforms, the need to consolidate and visualise data in a single system, seamless data transfer between platforms, managing increasing volumes of data, uncertainty around data ownership, and an unclear value proposition for adopting digital technologies.

Key barriers to adoption included:

- Limited awareness of available industry service providers
- Uncertainty about which technologies to adopt
- Difficulty demonstrating return on investment
- Lack of integrated platforms
- Ongoing subscription costs
- Commercial ownership of platforms and associated data
- Lack of trust in data management and sharing arrangements

Broader industry challenges associated with data sharing were also identified, including data fragmentation, time-consuming data collection and analysis, manual integration processes, inconsistent data standards, poor interoperability between systems, limited mechanisms for data sharing for industry benefit, and slow adoption of digital technologies. Collectively, these issues demonstrated that the agricultural sector was not yet realising the full value of its digital data.

Following discussions between GGA, DPIRD (including Art Diggie) and interested grower groups, the WA Farm Data Sharing Project was developed to address these challenges and demonstrate practical pathways for improving agricultural data sharing and use.

Benefits to GGA

Participation in the project significantly expanded GGA's capability in digital agriculture. While GGA entered the project with strengths in project management, stakeholder engagement, extension and broadacre research and development, the project accelerated organisational knowledge in digital agriculture, agricultural data systems, modelling, systems design and intellectual property management.

Both GGA staff and member grower groups increased their understanding of digital technologies, data management and the terminology associated with digital agriculture. This capability building has strengthened GGA's confidence to lead and support future projects involving digital technologies, data governance and collaborative innovation.

The project also reinforced the importance of establishing strong digital foundations before expecting widespread data sharing and advanced analytics. Many of the barriers identified during GGA's initial consultation—including fragmented data, interoperability challenges, trust, and unclear value propositions—continued to influence project delivery. These findings confirm that addressing these foundational issues remains critical for increasing technology adoption and enabling industry-wide data sharing.

Future opportunities

The project has established a platform for future digital agriculture initiatives. Immediate opportunities include expanding the current liming framework to investigate variable-rate lime applications, which will require more sophisticated data integration and modelling. The underlying data-sharing framework also has potential to support additional use cases, including carbon accounting, machinery investment decisions, and other whole-farm business management applications.

Through its involvement, GGA has strengthened both its capability and its networks, positioning the organisation to lead collaborative digital agriculture projects that deliver practical outcomes for growers.

Technology partner – AxisTech

Wes Lawrence, Managing Director, Axistech, Perth, WA

Suzzane Loveland, Program Marketing Manager, Axistech, Perth, WA

The WA Farm Data Sharing Project has been a valuable opportunity for AxisTech to demonstrate our data and systems capabilities, particularly in relation to the importance of making agricultural data findable, accessible, interoperable and reusable. The project has reinforced that strong digital foundations are critical to enabling extension, supporting grower engagement and allowing more advanced analysis and modelling to occur. The project has also provided an important opportunity to collaborate with DPIRD and GGA, bringing together industry, research, grower networks and technology capability to support a shared project outcome. This type of collaboration is critical in projects that rely on strong technical foundations, practical grower engagement and research that can be translated into usable, real-world tools. As technologists, we naturally see digital systems as an important enabler of research adoption. Across many of the projects we are involved in, grower engagement is often one of the most challenging elements. In many cases, this challenge is closely linked to data. The data may not exist, may be difficult to access or may not be available in a format that can be easily reused. Meaningful grower engagement also requires a clear value proposition for the grower, particularly where their time, data and input are required. This can be difficult to define at the beginning of a strongly research-focused project.

The project also highlighted the importance of aligning project design with the systems, technologies and workflows that growers are already using at the time of engagement. AxisTech was not formally included as a project partner. In future projects of this nature, earlier involvement from technology and systems delivery partners would be beneficial. It would allow for earlier input into data workflows, grower engagement, system design and the practical delivery of project outcomes. The project demonstrated the value of taking a foundational piece of agronomy research, such as iLime, and applying advanced data science techniques to create complex scenario modelling. It showed that grower data can be collected, managed across multiple parties and relationships, transformed into a usable format and delivered back to growers in a way that supports practical decision-making.

The project has also demonstrated the potential to take a highly manual, research-led model and process, then transform it into a more digitised and relatively automated workflow that can be delivered at a commercially realistic cost point. There is now an opportunity to expand this approach beyond the initial liming and agronomy framework and further explore the role that AI can play in improving the process, scaling the outputs and supporting better decision-making for growers.

Research partner – DPIRD

Balwinder Singh, Principal Research Scientist, DPIRD, Perth, WA

The Food Agility project work helped shift DPIRD's digital agriculture capability from fragmented farm, crop and climate data toward practical, scalable decision-support tools. A key impact was the creation of a stronger partnership ecosystem across government, research and industry, bringing together DPIRD, (internal research groups), Grower Group Alliance, AxisTech. These collaborations connected domain expertise with data science, machine learning and platform-development capability, enabling outcomes that would not have been achieved by one team working alone. Through this work, DPIRD advanced data-driven tools such as the LEAP framework for real-time lime decision applications, automated privacy-protected farm data-sharing workflows. The projects also built lasting internal capability by strengthening staff skills in machine learning, data analysis, decision logic, tool development and visualisation of complex agricultural data. Automation reduced manual workload and allowed staff to focus on higher-value analytical and strategic tasks across cropping systems. Importantly, the work created assets with clear pathways beyond research. LEAP intellectual property progressed toward commercialisation with Grower Group Alliance and AxisTech, showing that the outputs had value for real-world application. Overall, the Food Agility projects turned disconnected agricultural data into operational products, new organisational capability and externally validated impact, extending DPIRD's role from analysis and research toward scalable digital agriculture solutions that support faster, more informed decision-making for industry.

Innovation partner - Food Agility CRC

Food Agility CRC supported project governance, innovation discipline, reporting and the connection between research, industry and technology partners. The project aligns with Food Agility's focus on data-enabled agricultural innovation by demonstrating how secure data exchange, co-designed analytics and digital delivery can create practical value for producers.

END-USER PROFILE



End-User Co-Design Workshop

The end users for this project are grain growers who already collect useful paddock, crop, yield and soil data, but need better ways to bring that information together and use it for farm business decisions. Much of this data already exists, but it may be stored in different places, such as soil test reports, yield maps, farm records, spreadsheets or farm management software. Growers need simple and trusted tools that can pull this information together, protect their control over the data, and turn it into clear advice they can use on farm.

For this project, the main focus was on helping growers make better liming decisions. Lime decisions are difficult because soil acidity can vary between paddocks and at different soil depths. Growers need to know where lime is needed, how much to apply, whether incorporation is worth doing, and which paddocks should be treated first. These decisions are also affected by crop rotations, yield potential, rainfall, lime quality, freight costs, grain prices and seasonal conditions. Because lime is a large investment and the benefits can take years to show, growers need information that helps them understand both the likely return and the risk. At the moment, the information needed to make these decisions is often spread across different systems. This makes whole-farm planning time-consuming and hard to do with confidence.

The value of the project is that it uses the grower's own data to produce customised reports and dashboard-ready outputs. These outputs compare different liming strategies and show likely soil and financial outcomes over time. This gives growers and advisers clearer information for deciding which paddocks to prioritise, which lime strategy may work best, and what level of risk is involved. It can also support discussions with advisers, banks,

insurers and business partners by showing likely outcomes, downside risk and upside potential in a more transparent way.

OBJECTIVES

Australian agriculture is becoming increasingly data-rich, with growers generating valuable information through machinery, sensors, soil testing, yield maps, weather records and farm management systems. While these data have significant potential to improve productivity, reduce risk and support better farm decisions, they are often fragmented across multiple platforms, making it difficult for growers to combine and use them effectively. Secure data sharing offers an opportunity to integrate these datasets and transform them into practical, farm-specific insights for decisions such as lime application, nutrient management and other soil amelioration strategies.

However, the greatest barrier to farm data sharing is not technology but trust. Growers need confidence that their commercially sensitive data will remain secure, that ownership and control will be maintained, and that data will only be used for agreed purposes while delivering clear value back to their business. Building this confidence requires transparent governance, secure data transfer, clear data-sharing agreements, and farmer-centred solutions aligned with principles such as the National Farmers' Federation Farm Data Code. By addressing these challenges, trusted data-sharing systems can unlock the full value of farm data and support more informed, evidence-based decision-making across the agricultural sector. To address these challenges farm data sharing project commenced with following objectives;

OBJECTIVES

The project objectives were:

- Test farmer engagement with a data sharing platform.
- Develop a whole-farm model that can be used to make investment decisions, using lime application as the initial use case.
- Increase engagement of farmers and technology companies with the model and platform.
- Provide a use case demonstrating value for farmers from the exchange of electronic data.

The project addressed the following research questions:

1. Can a Monte Carlo model be created to simulate whole-farm decisions for lime application?

2. How can farm businesses use Monte Carlo whole-farm simulations to maximise return on investment from lime across the farm enterprise, and what role does risk profile play in these decisions?
3. Can electronic transfer of information be employed to communicate the farm and external data needed to operate this model, and to transfer reports of results back to the farm manager?
4. Can this model demonstrate potential future crop productivity for lime application, and what evidence is needed to support use by banks, insurers and property valuation experts?

METHODOLOGY AND RESULTS

1.1 Co-designed Research approach

The project adopted a practical, use-case-driven approach, using lime application as the test case. The team engaged early-adopter growers and technology partners, established data-sharing agreements, digitised and transferred farm data, conducted model simulations, returned results to growers, and incorporated grower feedback to improve reports and dashboards.

Food Agility Innovation team conducted series of train the trainer's workshop on Innovation fundamentals and introduction experimentation describing the key stages of the innovation process, including how ideas are generated and validated, and design and refine customer discovery interviews, designing tests and developing a testing plan for the dashboard.

Train the Trainers Workshop 1: Customer Discovery Process

The first workshop focused on getting the team ready to speak with growers in a useful way. The Food Agility Innovation team worked through the basics of customer discovery and showed how to design interview questions that reduce bias and bring out better evidence. The aim was to make sure the team was not just asking growers to confirm what we already thought, but was actually learning how they make liming decisions and what problems they face.

This workshop helped shape the grower interview questionnaire. It gave the team a clearer way to ask about current practices, pain points, workarounds, attitudes to data sharing, and what growers would need from a liming decision-support platform. This was an important first step because the project needed real grower input before moving too far into dashboard design.

Train the Trainers Workshop 2: Discovery Analysis, Synthesis and Sensemaking

The second workshop focused on what we learnt from the grower interviews. The team reviewed the interview data and looked for common patterns across grower problems, desired outcomes, current tools, workarounds and opportunities. This helped turn the interview notes into practical insights that could guide the next stage of the project.

The workshop also helped the team make sense of what growers were really saying. It showed that growers were not just asking for more data. They wanted information that was clear, practical and useful for real liming decisions. This helped the project team better understand what mattered most to growers and what should be tested in the platform.

Train the Trainers Workshop 3: Dashboard Design and Testing

The third workshop focused on the dashboard itself. The team worked through what must be true for the platform to succeed, what assumptions needed testing, and how to get useful feedback from growers and agronomists. The workshop also looked at how to reduce bias in feedback, so the team could see whether users were genuinely finding the dashboard useful. The workshop included practical design activities, such as asking users to draw their ideal dashboard for liming decisions, prioritise what information was essential versus nice to have, and test different ways of showing the information. This helped the team move from general ideas into a more practical dashboard design that could be tested with growers using real decision-making scenarios.

Based on learning from these workshops. throughout the project, a series of grower workshops were conducted by project team, beginning with a customer discovery process. This enabled the team to simultaneously assess the desirability, feasibility, and viability of the proposed solution specifically, whether growers were willing to share data, whether the end-to-end workflow could be implemented technically, and whether the resulting outputs could support real-world decision-making.

Building on these insights, the project team worked closely with growers to co-design dashboard templates, test prototype outputs, and integrate feedback into subsequent iterations. This collaborative and iterative approach ensured that the final dashboards were aligned with grower needs and expectations.

The following sections describe the activities undertaken, key outcomes, and lessons learned from each workshop conducted throughout the project, and description of LEAP development.

1.2 Grower Workspop 1-Customer Discovery process

1.2.1 Workshop purpose

The aim of customer discovery process was to identify farm businesses where soil acidity is a relevant production constraint and where liming decisions are complex, expensive and variable to test the value of a whole-farm lime decision-support tool. We use the rationale for selecting growers using Western Australian soil acidity risk maps, particularly soil pH maps for the 0–10 cm and 20–30 cm soil layers.

Soil acidity is a major economic and natural resource threat across the south-west agricultural region of Western Australia. About 14.25 million hectares of wheatbelt soils are estimated to be acidic or at risk of becoming acidic, with estimated production losses from acidity of \$498 million in 2009. Soil acidity is also identified as one of the few soil constraints that can be treated through appropriate management, primarily through liming.

The project used WA acidity maps to help segment and prioritise grower engagement based on with soil pH. The WA acidity maps provided a regional indication of where topsoil and subsoil acidity were likely to constrain production. The 0–10 cm map identified areas where

surface soil pH was below the recommended target of pH_{Ca} 5.5, while the 20–30 cm map identified areas where subsoil pH was below the recommended target of pH_{Ca} 4.8 (Fig.1). pH measures the active hydrogen ion concentration in a substance, whereas pH_{Ca} measures soil acidity suspended in a weak calcium chloride solution instead of pure water. Standard pH fluctuates with seasonal changes and soil moisture levels, whereas pH_{Ca} stays stable across different seasons and varying salt levels, making it more reliable for tracking long-term trends.

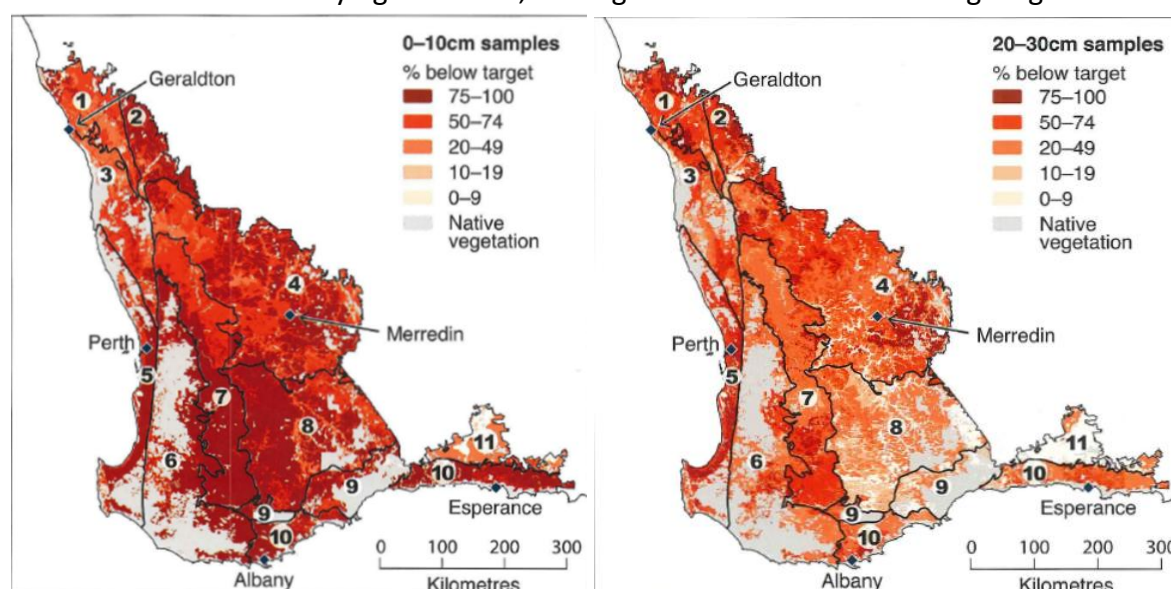


Fig. 1 Percentage of sites sampled 2005-2012 with soil pH at 0-10cm below target pH_{Ca} 5.5 and Percentage of sites with soil pH at 20-30cm below target pH of 4.8

Using both layers was important because growers may face different lime management problems depending on where acidity occurs in the soil profile. For example, topsoil acidity may be addressed through surface lime application, while acidity deeper in the profile may require higher rates, repeated applications, incorporation, or integration with other amelioration practices. Subsoil acidity is particularly important because growers may not detect it if they rely only on surface soil tests, yet it can restrict root growth and reduce crop access to water and nutrients.

The selection process therefore sought growers who were likely to have meaningful lime decision problems, including growers with:

- acidic or at-risk soils in either topsoil or subsoil layers;
- paddock-level variability in soil pH or production performance;
- recent or historical soil testing data;
- experience applying lime, gypsum or other ameliorants;
- willingness to discuss farm data, soil health and decision-making;
- sufficient paddock, crop and management data to support modelling.

1.2.2 Farmer Engagement Approach

Grower engagement was led through project partners, including Grower Group Alliance, AxisTech. Initial grower interviews were focused on farm context, soil health practices, liming experience, decision-making processes, frustrations, tools used and willingness to consider improved decision-support approaches.

Grower profile and farming context

The participants in customer discovery process was a group of experienced Western Australian grain growers from the central wheatbelt and related broadacre farming regions, included growers from areas such as Piawaning, Nolba, Ardath, Corrigin, Bendering, Merredin, Pingelly/Brookton and Kunjin/Corrigin-Brookton. Most are long-term farmers or farm business managers with substantial experience, commonly ranging from around 20 years to more than 50 years in farming.

The farms represented a range of broadacre grain and mixed farming businesses. Cropped areas varied from about 900 hectares to more than 3,000 hectares, with some businesses managing larger total farm areas. Common crops included wheat, barley, canola, lupins. The main crops included canola, barley, wheat, lupins, oats and hay. Reported indicative yields included canola around 1.2 t/ha, barley around 2.5 t/ha, wheat around 2.1 t/ha and lupins around 1 t/ha. The growers are with considerable experience, and likely to make and trust their own decisions, often with advice from agronomists, fertiliser representatives or specialist consultants. They generally had strong practical knowledge, long memories of paddock performance, and a preference for tools that support, rather than replace, their own judgement.

Current state of soil management practices

Soil health was managed through a combination of soil testing, agronomic advice, fertiliser planning, lime or gypsum application, and in some cases more intensive soil amelioration. Growers commonly used soil tests to understand pH, phosphorus, potassium and other nutrient reserves. Several growers tested paddocks every two to three years, while others used more targeted or less frequent testing depending on paddock history, perceived risk and cost.

Soil testing is a critical input into lime and fertiliser decisions, some growers relied on formal tools such as AgWorld, Decipher, Summit Connect, CSBP data, Precision Agronomics reports, GRDC lime pit tables and agronomist advice. Others used less formal systems, such as paper records, memory, local experience and simple rules of thumb. Growers described using fertiliser to replace nutrients, set up crops for an average or better season, and then adjust nitrogen or other inputs as seasonal conditions became clearer. However, cost and risk were repeated concerns. Fertiliser, lime, freight, machinery time and seasonal uncertainty all affected how confidently growers could invest in soil improvement.

Relevance of lime and soil acidity for farmers

Liming is highly relevant for growers managing acidic soils, but not equally relevant for all farms. Some growers described soil acidity as a major constraint and liming as essential to maintaining yield and profitability. Once pH drops below about 5.5, yield decline becomes likely, they described lime as the first item in the budget because “without the lime you just don’t get the yields”. Growers generally aimed to raise or maintain soil pH, often targeting pH above 5 or around 6 through the profile. Some growers were concerned about poor pH below 10 cm or 30 cm, while others had neutral to alkaline soils and did not see lime as a current priority.

The evidence showed that lime decisions are not simple “apply or do not apply” decisions. Growers must consider current pH, depth of acidity, likely yield response, product quality, neutralising value, fineness, freight costs, spreading logistics, incorporation options, soil type and budget. Several growers were moving toward larger applications, often 2 t/ha or more, but in more precise locations rather than blanket whole-farm applications.

How growers currently make liming decisions

Growers use a wide variety of approaches to lime decision-making. Decisions usually sit with the farmer, supported by agronomists, fertiliser advisers, soil consultants or family members. The tools mentioned included soil tests, crop performance, paddock history, Decipher, Summit Connect, Aglime calculators, CSBP recommendations, Precision Agronomics maps, lime pit tables and spreadsheets.

Despite this range of information sources but none of the tools mentioned appeared to provide a full liming optimisation program. Growers were often combining partial information themselves, using experience and judgement to determine rates, frequency and priority paddocks. In several cases, growers wanted simple, practical tools rather than more complicated software.

Decision-making was strongly influenced by cost and logistics. Growers considered lime source, neutralising value, freight distance, spreading windows, paddock accessibility, machinery availability and the opportunity cost of tying up labour and equipment. Budget limitations could delay liming even where growers recognised the agronomic need.

Pain points, frustrations and willingness to pay

The most common frustrations were operational and financial. Growers identified trucking lime, freight costs, truck availability, wind-limited spreading windows, slow spreading, machinery wear, labour requirements and the difficulty of moving lime through the soil profile as major issues. Freight was particularly important, with one grower quote noting: “Freight’s nearly \$50 a ton... killer.”

Some growers had become used to the inconvenience and rated frustration as moderate, while others saw liming as a repeated annual burden. Growers who spread large tonnages described February or pre-seeding periods as particularly pressured.

The consequences of not addressing soil acidity included reduced yield, lower profitability, missed opportunities in high-rainfall years, inefficient fertiliser use and continued decline in soil condition. Growers were willing to pay for better solutions where these reduced cost, simplified logistics, improved confidence or produced a more durable outcome. Some growers described willingness to pay in terms of what they already spend per hectare on lime programs, while others wanted higher-analysis products or stronger evidence that alternative approaches would pay.

What growers want from a better solution

There was a strong preference for simple, practical and trusted tools. Growers did not necessarily want another complex digital platform. They wanted something that reduces the time and complexity of combining soil tests, paddock data, lime source information, freight costs, rates, payback and risk. Growers wanted a product or method that could achieve the same pH outcome with less tonnage, less freight, fewer applications or better movement through the profile. Others wanted easier ways to collate data and produce reliable variable-rate layers, compare rates and pits on profitability and payback, or make long-term liming and soil-health strategies financially viable.

A better tool would need to be easy to explain, credible to growers and advisers, and able to show whether different strategies actually make a difference. It would also need to support paddock-level or zone-level decisions rather than only whole-farm averages.

Market segment and problem worth solving

The workshop directly tested whether the proposed liming tool solves a problem worth solving and for whom. The likely primary segment was identified as farmers with acidic soils, with a secondary or supporting segment being agronomists who support liming decisions.

The problem was considered painful and frequent for growers who actively manage soil acidity. It is not a one-off decision because pH slowly changes over time, lime programs need monitoring, and rates or priorities may change with seasons, budgets, paddock performance and rotation. However, the workshop also suggested that the project team needs to sharpen the evidence around whether the problem is 10 times better solved than by current alternatives, whether the accessible market is significant, and whether customers are excited and willing to pay.

Implications for the liming tool

The workshop findings suggest that the liming tool should be positioned as a practical decision-support system rather than a generic modelling platform. Growers need help

answering specific liming questions: where to lime, how much to apply, what product or pit to use, whether incorporation is worthwhile, what the likely payback is, and how much risk is involved. The value lies in converting fragmented soil, paddock, cost and seasonal data into a clear comparison of options.

For the tool to be useful, it should be simple, transparent and compatible with how growers already make decisions. It should work with soil-test data, pH depth information, lime cost and freight assumptions, paddock-level variability and grower risk preferences. It should also produce outputs that growers and advisers can interpret quickly, such as priority paddocks, likely return, payback period, cashflow risk and pH change through time.

1.3 LEAP (liming tool) Development

We developed a modelling framework, LEAP, which uses Application Programming Interfaces (API) to simplify ingesting data and interfacing with models using the data. The LEAP model uses Monte Carlo simulation to account for several possible outcomes and allow users to determine the best decision for them supported by their own historical data leading to a tailored result. The flexibility of an API-driven platform allows for the use of historical farm data and off-farm data from other sources to tailor recommendations for the whole farm that are directly derived from the farm's characteristics and grower's management practices. Rather than running a single paddock and single liming strategy as the Optlime or iLime models do, LEAP is capable of providing multiple scenarios and paddock results from a single run allowing the user to compare results and choose their optimal strategy for the whole farm. The LEAP model framework is written in the Julia programming language (Bezanson et al., 2017, Julia v1.12.4). The framework uses custom API clients to communicate with external data sources and models.

The LEAP model was developed using the Optlime model (Sandison and Bathgate, 1997; Gazey, 2008) as a test case. Optlime simulates the biological, physical and economic factors that are important for soil acidity management in Western Australia. Its purpose is to demonstrate how securely shared farm data can be transformed into practical decision-support outputs for growers, using lime application as the first use case. The broader project aims to test farmer engagement with a data sharing platform, develop a whole-farm model that can support investment decisions, and increase engagement between growers, technology companies and research partners.

It began as a modelling framework designed to run simulations using the iLime API, and evolved into a more complete, production-ready system capable of data ingestion, validation, modelling, calculation, output generation and data export.

1.3.1 Key components of LEAP modelling framework

iLime API is the modelling engine that LEAP calls to run lime response calculations programmatically. It turns the logic of DPIRD's iLime decision-support model into an API

service so LEAP can run many liming simulations automatically, instead of relying on manual, paddock-by-paddock use of the iLime app.

The initial release established LEAP's core functionality which is to run simulations with the iLime API. The iLime API is a custom-built C#.NET API translation of the iLime model written for this project, which is based on the mobile application version of the Optlime model (Sandison and Bathgate, 1997; Gazey, 2008). It supports all of the same functionality as the iLime mobile application but allows for programmatic access to the model. The API was tested and validated manually against the mobile application implementation of the model to ensure consistency of results. This allowed the project to convert the existing iLime decision logic into a programmatic modelling framework, making it possible to run many liming scenarios rather than manually assess paddocks one at a time.

The iLime API was containerized in a Docker environment that exposed the API's endpoints for use in the LEAP modelling framework. Using Docker containers allowed us to dynamically start and stop the model on demand and provided high throughput with several model instances running concurrently determined by the number of available threads rather than relying on a single instance.

The framework could run simulations with the iLime API and began using statistical distributions to estimate crop yield and crop price data. This was an important foundation because the liming decision problem is not deterministic. Growers face changing seasons, variable yields and uncertain prices. By incorporating statistical distributions, LEAP began to model a range of possible outcomes rather than a single fixed scenario.

Extrata- The Extrata® is a secure data sharing API service which is wholly owned by the Department of Primary Industries and Regional Development (DPIRD) and was developed by the eConnect team. Extrata® is a cloud-based platform that securely collects, stores, and manages farm data from multiple sources including farm management software, machinery telematics, and sensor. Extrata® is a logical evolution of an earlier eConnect Project initiative to develop an open information ecosystem that brought together growers, consultants, suppliers, traders and scientists across Western Australia. As an API Data Exchange Hub, Extrata provides a trusted and interoperable mechanism for primary producers to control how their valuable farm data, held on external platforms, is shared with advisers, researchers and service providers. By enabling seamless, permissioned data flows, Extrata is well positioned to modernise the digital backbone underpinning agricultural services, research programs, compliance systems and supply chain operations across regional WA and at a national level.

Extrata was the first platform to be successfully accredited under the Food Agility CRC Data Policy and has also received accreditation under the National Farmers Federation Farm Data Code. The platform assists primary producers by allowing them to publish virtual data bundles, both publicly and privately, within the Extrata data marketplace. These bundles contain a collection of API data endpoints and can be accessed via multiple data aggregators, with producers retaining individual governance controls over each access request. Extrata

does not enrich or store any data processed through the platform, with all data fully encrypted in transit.

ILimeClient is the LEAP component that enables LEAP to communicate with the iLime model API. In the LEAP workflow, it acts as the bridge between LEAP's prepared farm, soil, crop, lime and strategy data and the iLime calculation engine.

ExtrataClient is the LEAP component that enables LEAP to communicate with DPIRD's Extrata data exchange platform. It supports the secure movement of farm data into the modelling environment and the return of outputs back to the grower-facing system. ExtrataClient was deliberately separated from the core LEAP package, this helped keep LEAP focused on data preparation, modelling and output generation, while ExtrataClient handled communication with the data exchange layer.

The simulation and performance of LEAP was strengthened through multi-threading and containerisation. We introduced multiple Docker containers so LEAP could distribute iLime API calls across available Julia threads, improving performance for large simulation runs. This feature is important because whole-farm Monte Carlo liming simulations can involve many combinations of paddocks, soil profiles, crop rotations, prices, yields and liming strategies. Parallel processing allows LEAP to run these workloads more efficiently. A major development feature was enterprise-grade containerisation including full Docker integration, including complete containerisation with a secure BuildKit process. LEAP also added Singularity support, making it compatible with high-performance computing environments such as Pawsey.

Containerisation is important because it makes the system more portable, reproducible and production-ready. It reduces the risk that LEAP will only run on a developer's local machine and supports deployment across different computing environments. This is particularly relevant if LEAP is expanded beyond initial grower case studies or adapted to additional use cases requiring large simulation runs.

The project added an automated continuous integration and deployment pipeline using GitHub Actions for documentation deployment. This reflects a more mature software development process. Automated CI/CD helps ensure that updates can be tested, documented and deployed more reliably, reducing manual effort and improving software quality. Documentation became an important part of LEAP's development covering installation, environment variables, Docker container management, iLime API container management, documentation browsing, rainfall map generation, unit testing, code coverage reporting.

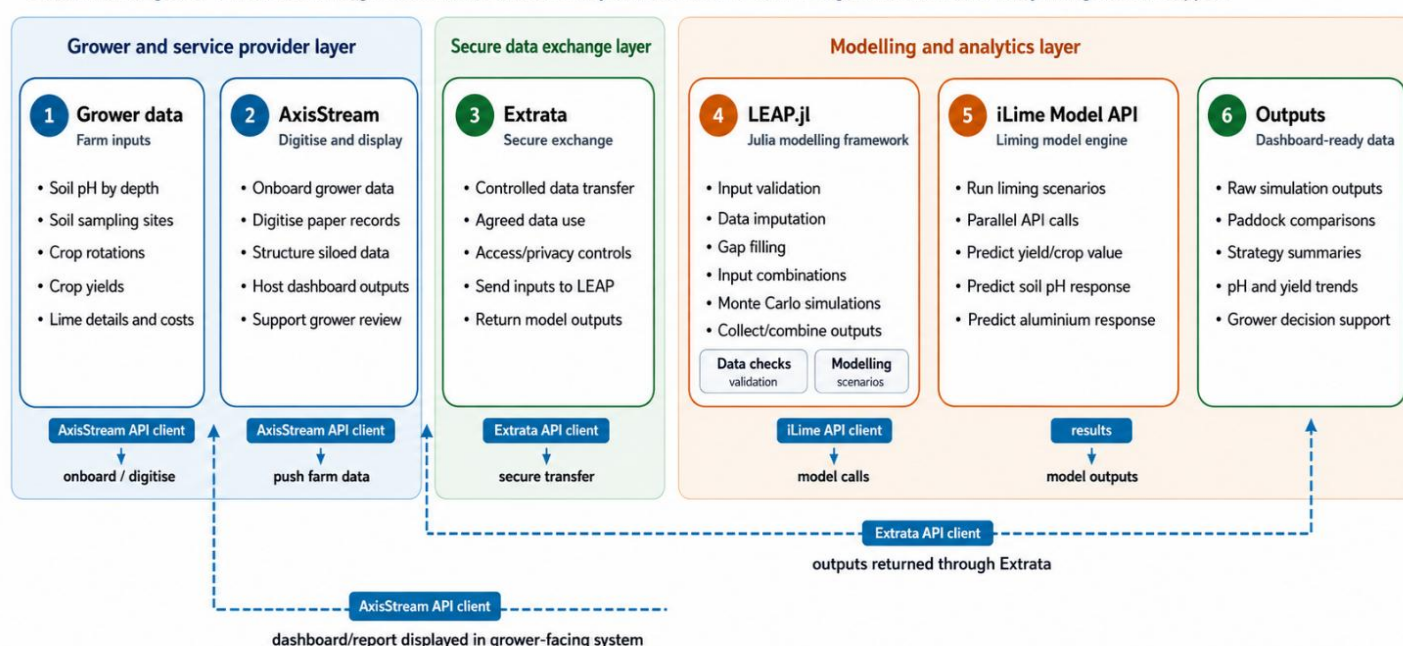
The documentation also includes exported functions from LEAP, ILimeClient and ExtrataClient. The codebase itself includes comments explaining how the code works and what it is doing. This documentation is important for handover, maintainability and future scaling. It means LEAP is not only a working model but a documented software asset that can be understood, tested and extended by other users or developers.

1.3.3 LEAP Data to Decision- Processing Pipeline

The LEAP framework is the modelling and data-processing engine, It begins with farm records collected or digitised through a farm data management platform, passes those data through the Extrata data exchange platform, runs whole-farm simulations through LEAP and the iLime model API, and returns outputs to the grower through AxisStream or another farm management interface.

LEAP framework workflow

Secure flow of grower-owned data through AxisStream, Extrata, LEAP.jl and the iLime Model API to generate dashboard-ready liming decision support.



Detailed processing pipeline as below with steps;

1.3.4 Ingesting grower data

The workflow begins with the grower's own farm data. This may include digital records already held in farm management systems, as well as paper records or siloed and unstructured data that need to be digitised before they can be used.

The grower data required for LEAP includes information that describes the farm's paddocks, soil condition, crop history and lime management. These data are essential because LEAP is designed to generate farm-specific recommendations rather than generic regional advice. The better the input data, the more tailored the modelling outputs can be. The framework recognises that grower data is often fragmented. Some information may sit in farm management software, some in spreadsheets, some in soil test reports, and some in paper records. A key function of the workflow is therefore to bring these data together in a structured and usable form.

1.3.5 Data digitisation, onboarding and visualisation

AxisTech plays a role as a third-party provider supporting data digitisation, grower onboarding and output visualisation. Its AxisStream platform is used to help ingest farm data and later display LEAP outputs in a visual dashboard format.

At the beginning of the process, AxisTech can help convert paper records, siloed data or unstructured records into digital farm datasets. This is important because modelling cannot occur until the data are available in a consistent and usable structure.

AxisStream also acts as an interface for the grower. It supports the movement of data into the workflow and provides a pathway for returning results to the grower in a visual and interpretable form.

1.3.6 Data Requirements

For the model to work, we will need the last three (3) to five (5) years of data for the whole property and a definition of each management unit, paddock or sub-paddock, however the land is managed.

Per Property or Whole Farm

- Nearest named location, e.g., Merredin, Northampton, Grass Patch, etc.
- Rainfall zone (this can also be inferred if geospatial data are provided with the soils data or from the nearest named location above)

Per Management Unit

The following list of data requirements provides us with enough information and data to gather further data or make assumptions about the farming practices used that will be necessary for us to run the model. Management units or paddocks must be uniquely identifiable either through a supplied geospatial file denoting polygon boundaries of each management unit or through the provision of unique management unit identifiers, e.g., “Barr Place North”, “Finke’s Place 1”, just as long any unique identifiers that are linked with each of the following data on a paddock-by-paddock basis:

- Cropping and flock details for the last three (3) to five (5) years, including:
- Cropping sequence or rotation per management unit and by flock structure,
- Yields for each year/paddock/crop, and
- Pasture and animals.

If only unique identifiers are provided, then the following soil property data are necessary to provide, if a geospatial file denoting the paddock boundaries is provided, then these data can be gathered by DPIRD and they are then optional but will provide a more tailored set of strategies for you:

- Soil types,
- Soil physical qualities from 0-10cm, 10-20cm and 20-30cm including:

- Texture,
- Gravel (%),
- Organic C (%),
- Initial pH

Optional Desirable Data

If available, it would be useful to the model to be able to access these data. However, they are not essential for the model to work. Please note that the results will not be as tailored to the farm as they could be given these data due to assumptions that need to be made to run the model. For example, if current baseline liming strategy is not provided, all results provided will be a measure against not liming rather than against the farm's current program or if fertilisation practices are not available, the rate of acidifying may be incorrect due to assumptions that are made about the source of N that was used.

You may provide as much or as little of this data as you wish. For example, with the baseline liming strategy data. It can be supplied completely or by whatever information that you have that you wish to share, e.g., only lime type and placement strategy may be provided or only the liming sequence with no other information. We will do our best to make reasonable assumptions based on current Western Australia agriculture practices.

Soil property:

- AI class

Baseline liming strategy that has been used including:

- Lime type,
- Lime source,
- Placement strategy,
- Incorporation method,
- Sequence, and
- Application costs

Cropping and flock details for the last three (3) to five (5) years including:

- Farm gate price for:
- Grain,
- Sheep, and
- Wool

Fertiliser usage for the last three (3) to five (5) years:

- kg/ha applied, and
- N (the compound + %N), e.g.,
- Urea,
- Liquid UAN,
- NH₄SO₄

Seeding N&P:

- kg/ha, and
- Compound

1.3.7 Extrata: secure data exchange layer

Once grower data are ready, the data are transferred through Extrata. In the workflow, Extrata functions as the data-sharing layer between AxisStream, LEAP and other API clients. Extrata is important because the project is not only about modelling lime decisions. It is also about demonstrating a trusted farm data-sharing process. Grower data can be transferred to the modelling system, used for an agreed purpose via ExtrataClient which supports the secure exchange of farm data, and then results can be returned through the same secure data exchange pathway.

1.3.8 The LEAP modelling module

LEAP's role is to transform grower data into model-ready inputs. This includes checking whether the data are complete, validating input values, filling gaps where appropriate, and generating the combinations of input data needed for simulation. It then manages the modelling process by calling the iLime model API multiple times across different scenarios. LEAP is designed to handle whole-farm modelling rather than a single paddock calculation. This allows it to consider multiple paddocks, crop rotations, soil profiles and liming strategies in a structured simulation framework.

1.3.8.1 Data preparation inside LEAP

Before modelling can occur, LEAP processes the incoming data through several preparation steps. Data checks confirm that the required data have been received and are in the expected format. Input validation checks whether values are reasonable and suitable for modelling. This may include confirming soil pH values, crop records, yield data or lime information. Data imputation and gap filling address cases where some required data are missing. This is important because real farm datasets are often incomplete. Data-ready-for-modelling preparation converts the cleaned and validated data into the structure required by the modelling pipeline and iLime API. This preparation stage is essential because the quality and consistency of the input data directly affect the reliability of the model outputs.

1.3.8.2 Scenario building and Monte Carlo simulations

After data preparation, LEAP builds modelling scenarios. These scenarios combine farm data with different assumptions and management options, such as crop rotations, yield expectations, lime rates, lime products or other variables relevant to lime decision-making. LEAP then runs Monte Carlo simulations. This means the framework does not generate only one fixed outcome. Instead, it runs many possible combinations to represent uncertainty in

factors such as yield, price and seasonal conditions. This is particularly important for liming decisions because lime is a long-term investment and the financial return depends on future seasons and crop performance. Through this process, LEAP can help growers compare likely outcomes, best-case and worse-case scenarios, and the range of possible returns from different liming strategies.

1.3.8.3 iLime model API: liming calculations

LEAP then uses iLimeClient to send these prepared inputs to the iLime API. The iLime API performs the liming calculations and returns model outputs such as predicted soil pH response, crop yield response, crop value, cashflow and impacts of different liming strategies. The iLime model API is the model service that performs the liming calculations. The default run compares seven iLime strategies over a 20-year analysis period against a no-lime baseline:

- 1 tonne of lime every 10 years.
- 1 tonne of lime every 7 years.
- 2 tonnes of lime every 10 years.
- 4 tonnes of lime in year 1.
- 5 tonnes over 15 years: 2 tonnes in year 1, 2 tonnes in year 6 and 1 tonne in year 15.
- 4 tonnes incorporated to 20 cm in year 1.
- 4 tonnes incorporated to 20 cm in year 1 plus 1 tonne in year 10.

LEAP calls the iLime API multiple times, including through parallel calls, to run many liming amelioration scenarios. For example, in dataset with 4 Paddocks running 3-year crop rotations with 5 Soil Sampling Site Profiles has total combinations of 2916 Crop Rotations and with 4 different types of liming agents for 4 farms = 87400 runs of the iLime model over a 20-year analysis period and = 1,749,600 rows of data.

The iLime model predicts key outputs such as:

- yield and crop value
- soil response to liming
- soil pH change
- exchangeable aluminium response

1.3.9 Raw simulation outputs and dashboard preparation

Once the iLime API returns results, LEAP collects and combines the raw simulation outputs. These outputs include modelling results across multiple paddocks, soil profiles, crop rotations, liming strategies and simulation assumptions.

The outputs are then prepared for reporting or visualisation. Figure. 1, 2 and 3 shows different raw simulation outputs feeding into a dashboard environment. AxisTech support the visualisation of these results for growers. This step is important because raw model outputs are usually too complex for direct grower use. They need to be summarised and visualised in ways that support practical decisions, such as which paddock to prioritise, which lime strategy produces the best return, or what level of risk is associated with a given option.

1.3.10 Returning results to growers

The final stage of the workflow returns the outputs to the grower. Results are passed back through the Extrata API client and visualised through AxisStream or a similar farm management platform. The grower can then access dashboards, reports or visual outputs that support whole-farm liming decisions.

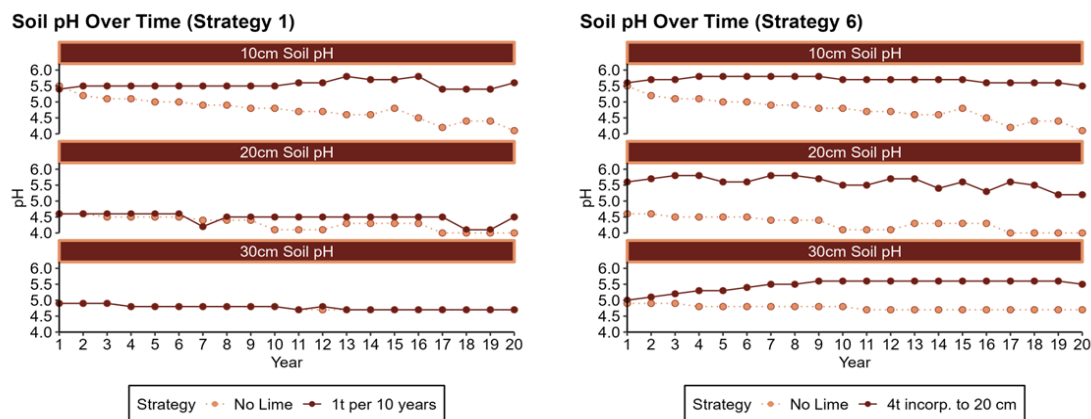


Figure 1: Soil pH values over 20 years for a liming strategy 1 of applying 1 tonne per 10 years and strategy 6 4 tonnes incorporated to 20 cm in year 1, at three soil depths, 0-10 cm, 10-20 cm and 20-30 cm. The average, most likely pH values for this strategy are represented with the solid line in red, while the average, most likely pH values pH for the unlimed strategy are represented with a dotted line in an orange colour.

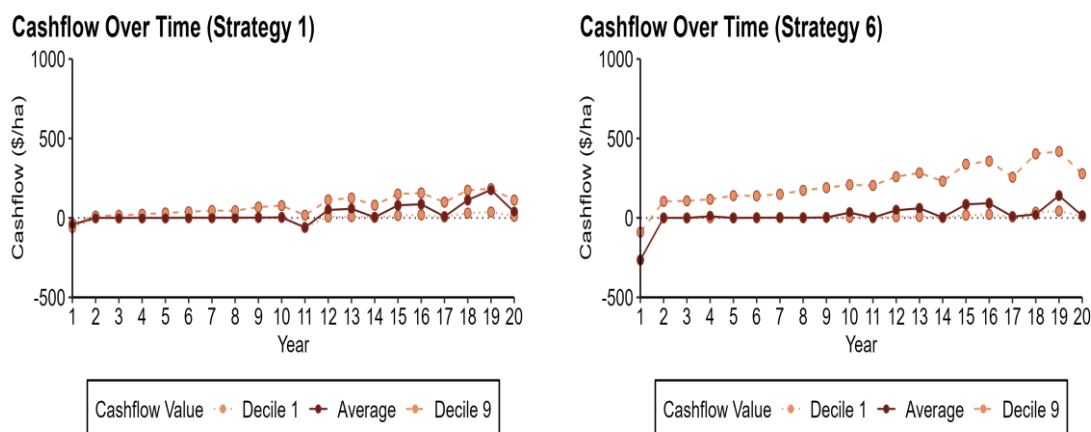


Figure 2: The likely monetary gain per hectare for a liming strategy of applying 1 tonne per 10 years and strategy 6 which is 4 tonnes incorporated to 20 cm in year 1 expressed as dollars per hectare. The average, most likely cashflow values are shown here for all strategies. The average, most likely cashflow values for this strategy are represented with the solid line in red, dotted line in an orange colour represent decile 1 and decile 9 cashflow for this strategy.

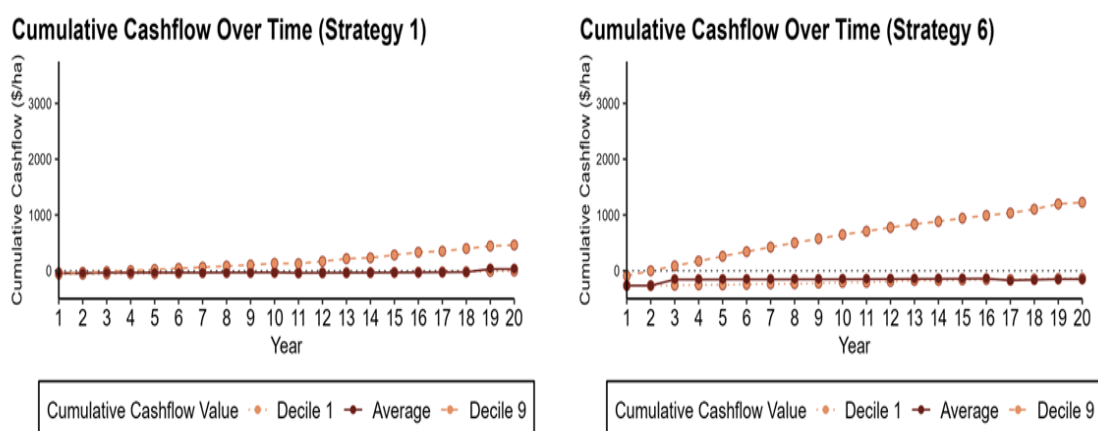


Figure 3: Cumulative cashflow or the sum of the previous years' cash flow, showing how much debt or available cash exists at a given time for a liming strategy of applying 1 tonne per 10 years and strategy 6 which is 4 tonnes incorporated to 20 cm in year 1 expressed as dollars per hectare. The average (most likely values) cashflow is shown here for all strategies. The average (most likely values) cumulative cashflow for this strategy are represented with the solid line in red, dotted line in an orange colour represent decile 1 and decile 9 of cumulative cashflow for the liming strategy.

This closed-loop workflow is central to the WA Farm Data Sharing project because it demonstrates how growers can retain a trusted data-sharing pathway while receiving practical value from their own data.

1.4 Farmer Engagement

The WA Farm Data Sharing Project has required strong grower engagement because the success of the liming decision-support tool depends on recruiting growers who are willing to share farm data, test model outputs, and provide meaningful feedback. However, grower recruitment has proven challenging, as participants need to meet several criteria simultaneously: they must be interested in data-driven decision-making, have a genuine liming issue, possess soil test data to 30 cm depth, and be willing to engage with the project team during busy operational periods such as seeding.

Throughout the recruitment process, the project team found that identifying suitable participants is not simply a matter of finding "data enthusiasts." Some growers are interested in digital technologies but do not currently have a significant liming requirement, while others have a clear need for lime management but lack the necessary soil data, time, or willingness to participate. The ideal participant therefore lies at the intersection of data readiness, a practical liming need, and an active commitment to the project, making recruitment more complex than initially anticipated.

A key challenge has been the timing of engagement. Growers are often difficult to contact during peak farming operations, particularly seeding, yet this is when many project activities including data collection, data-sharing agreement completion, and follow-up discussions need to occur.

Initial engagement was slow in particular as the project team could not describe the end product and results in a clear manner to engage grain growers and/or grower groups; as they were developing prototypes of both the lime modelling results (which the team focused on at the start of the project, this was important to determine that the results were correct and what was expected, but it was at the detriment of the digital services platform) and the dashboard.

1.4.1 Early Adopters Community

The WA Farm Data Sharing project was launched via a Zoom meeting on 6 July 2021 to the Grower Group Alliances network of grower groups, interested farmer members and industry. This was followed by direct emails to various grower groups who indicated an interest during the projects development, project updates on the GGA's website (<https://www.gga.org.au/activity/wa-data-exchange/>), GGA Newsletter and GGA & DPIRD Social Media.

GGA sought members for an Early Adopters Community who would be provided regular updates on progress of the project and provided a sounding board for project ideas. Very early within the project a community of 19 interested grower groups, individual farmers and industry indicated an interest. This number has ebbed and flowed with the projects cycle, reaching the heights of 33 members, with a core group of 10 being retained over the life of the project.

It was hoped that members of the community would be growers that would sign up to be involved in the project and share data. The first three growers who indicated a strong interest in being involved in this project came from the Esperance Zone Innovation (EZI) Group, a grower group who have been involved since the inception of the project. While only one grower actually shared data (which was his prime motivation in being involved), change in management and a lack of acidity and liming prevented the others being involved.

This group was important to the success of the project and the majority of the growers involved with the project have come from the community via themselves or grower groups nominating them.

Engagement of grower groups and individual grower groups has been difficult over the life of the project. A Communications and engagement plan was developed with the project outlining project updates which would be used to engage growers in the project and ultimately sign up to share their farm data.

Project updates were shared across all social media platforms, GGA newsletters (reach of 1200 people), Rural Press such as the Farm Weekly. The project was also promoted at field

days such as Dowerin Machinery Field Days (2023, 2024 & 2025), GRDC Research Updates (2022, 2023, 2024, 2025), Grower Group Field Days such as Stirlings to Coast Field Walk 7 July 2022, Food Agility CRC Research Symposium (2022, 2024, 2025), WA AgTech Meet Ups panel discussions (2022, 2024), Australian Agronomy Conference Oct 2024 presentation and paper and a range of other presentations by all partners GGA, DPIRD & AxisTech. Individual 1:1 conversations were had with grower groups (Southern Dirt, Nyabing Farm Improvement Group, Stirlings to Coast Farmers etc), individual farmers and Corporate Farm businesses (Lawson Grains/Merredin Farms).

At the end of 2024 the engagement/communications pivoted from a call of action to project progress. The recruitment strategy also expanded to focus on specific ideas – Grower groups were compensated for the time it took to find growers to get involved, we promoted supporting your local sporting club or similar the payment could go towards a good cause. GGA utilised their networks calling in favours and personal connections to bring the second farmer in to share their data and review an early form of the report/platform.

The project team also reconnected with DPIRD's Liming project teams. Southern Dirt a grower group who have indicated an interest and have been involved in the early adopter's community had several (5) interested growers working with liming and potential for variable rating. A mini project was developed with Southern Dirt where 5 growers shared their data with the project. Completing the total number of farmers who needed to be involved.

1.5 Grower Workshop 2-Data Visualisation & Decision Support Tool Design

In this workshop, we tested how growers think about liming decisions and how information should be presented in a dashboard or platform interface. We conducted a workshop which was designed to translate grower decision-making needs into practical dashboard requirements. Rather than beginning with a technology solution, the process explored how growers structure liming decisions, what data they need, what information is critical versus optional, and what forms of visual presentation would best support real-world action.

The primary objective of the workshop was to understand how growers and advisers mentally structure a liming decision. This included identifying the information they look at before deciding whether to lime, how much lime to apply, where lime should be applied, and what level of investment is justified. A second objective was to force trade-offs between possible dashboard features. The project team wanted to identify which information is genuinely required to make a liming decision, rather than simply collecting a long list of desirable features. This was important because the tool needs to support practical decision-making, not overwhelm users with unnecessary complexity. A third objective was to test different visual representations of liming information. Growers were asked to consider which formats would best help them interpret soil pH, compare paddocks or zones, assess return on investment, compare scenarios and export recommendations for machinery or other farm systems.

1.5.1 How growers make liming decision

Growers use a broad set of factors that influence whether and how lime is applied. These included different lime sources, landed lime price, soil pH, pH buffering capacity, predicted lime removal, rotations, variable-rate technology, carbon considerations, finance, opportunity cost, ROI, aluminium risk, yield response, rainfall zone, nitrogen targets, incorporation cost and spreading cost. Which showed that liming decisions are multi-dimensional and growers are not only asking whether pH is low. They are also considering product choice, transport cost, paddock variability, expected yield response, equipment requirements, seasonal risk and whether the investment competes with other farm priorities.

1.5.2 Priorities feature for the liming tool

Grower identified several critical requirements: recommended lime rate, paddock pH status, aluminium, total tonnes required, zones within paddocks, pH buffer, expected performance or yield response, crop rotations, priority paddocks, total in-season cost and rainfall zones. Features considered useful but less critical included carbon, ROI range, soil data, lime source, rotations, whole-farm pH status displayed spatially, paddock maps showing pH zones by soil type, crop-specific thresholds such as faba beans above pH 5.6, export files for machinery platforms such as John Deere or Case, and variable-rate technology maps. The results indicate that growers want the platform to first answer the practical questions of rate, location, cost, priority and expected response. Additional analytical features are valuable, but they should not replace the core decision-support functions.

1.5.3 How to visualise of the required information

Grower considered visual options for whole-farm soil pH status, paddock or zone-level pH, expected ROI, scenario comparison and export options. For whole-farm soil pH status, growers preferred a colour-coded farm map. They wanted to see pH spatially across the farm rather than read a simple summary statement. Paddock-level tables were also useful, but as a secondary format.

For paddock or zone-level soil pH, the strongest preference was for a map with selectable paddocks. There was also support for ranked lists and small multiples by soil type. This suggests that users want both spatial context and the ability to drill into specific paddocks or management zones. For expected ROI, participants preferred more detailed comparison views, such as a bar chart comparing cost versus return and a table by paddock. Simple summary ranges received less support, suggesting that growers want transparent numbers when evaluating investment decisions. For scenario comparison, the preferred format was a comparison table, with some support for side-by-side summary cards. This shows that growers want direct side-by-side comparison of options when weighing liming strategies. For

export options, the strongest preference was for all export formats to be available, including outputs suitable for use in machinery and variable-rate technology systems.

1.5.4 Key results and findings

a) Growers want spatial decision support

A clear finding from the workshop is that growers prefer spatial and paddock-level representations. Whole-farm summaries are useful, but growers need to see where the problem is located. A colour-coded farm map showing pH status was preferred because it aligns with how growers think about paddocks, zones and operational priorities.

This has important implications for dashboard design. The platform should not rely only on tables, text summaries or aggregate farm-level metrics. It should prioritise interactive maps that allow growers to see whole-farm pH status, select paddocks, inspect zones and compare areas based on soil condition, expected response and required lime rate.

b) Paddock and zone-level information is essential

Growers highlighted the importance of zones within paddocks, pH buffering capacity and paddock-level pH. This shows that growers do not view liming as a single whole-farm decision. They need to make targeted decisions at the paddock or zone level, particularly where soil pH, soil type and yield potential vary spatially.

The dashboard should therefore support decisions at multiple scales: whole farm, paddock and management zone. It should allow users to move from an overview of farm acidity risk to a detailed paddock-specific recommendation.

c) Cost and return must be visible

Growers identified total cost in season, landed lime price, incorporation cost, spreading cost, opportunity cost and expected ROI as important considerations. While return on Investment was listed as “nice to have” in one part of the prioritisation exercise, expected performance and total cost were treated as critical, and the visual representation exercise showed strong support for detailed cost-versus-return comparisons.

This suggests that the dashboard should make the financial implications of lime decisions clear. Growers need to see not only the agronomic recommendation, but also the cost of acting, the likely production benefit, and how options compare. Tables and charts that compare cost, return and payback by paddock or strategy are likely to be valuable.

d) Growers need to compare scenarios directly

The preferred visual format for scenario comparison was a comparison table. This indicates that growers want to compare liming strategies using direct numbers rather than interpret broad summary statements.

A useful dashboard should allow growers to compare scenarios such as different lime rates, different lime sources, surface application versus incorporation, or immediate versus delayed application. Comparison should include cost, tonnes required, expected pH change, yield response, ROI or return range, and priority ranking.

e) Export functionality matters

Participants preferred having all export options available, including exports suitable for John Deere, Case and variable-rate technology systems.

This finding is important because it links decision support to implementation. A recommendation is more useful if growers can translate it into machinery-ready outputs, variable-rate maps or files that can be shared with advisers and contractors. The platform should therefore include export functionality as part of its design, not as an afterthought.

f) Keep the interface practical and grower-centred.

The workshop showed that growers prefer actionable views over simplified statements. The platform should help them decide what to do next, not simply describe the problem.

1.6 Grower workshop 3- Recommendations from Platform Demonstration

Workshop Feedback

Based on the recommendations and feedback on growers' workshop on visualization of decision tool, project team developed a dashboard prototype and tested with growers for their feedback by conducted user testing workshop and collecting the feedback on each component on dashboard. We compiled the feedback as below;

1.6.1 What's Working Well

The platform's spatial design should be retained. Participants responded positively to the whole-farm map view because it helped them quickly understand where soil acidity issues were located across the farm. The paddock toggle was also useful, allowing users to move easily between paddocks and inspect paddock-level information.

The pH colour-coding system should remain a core feature. Participants found the colour gradient easy to interpret, including colour-blind participants who were still able to distinguish between pH levels using the shading. The ranked "Top 10" paddock list was also well received because it helped identify paddocks of greatest concern based on low pH values. These features show that growers value visual, spatial and paddock-level decision support. Future development should continue to prioritise maps, pH status, paddock ranking and simple visual cues that help growers identify where action is needed.

1.6.2 What is not working

The platform should clearly display the selected soil pH depth wherever pH data are shown, especially in the ranked paddock list. When users change the depth selector, the ranked list

must update with a visible label showing whether the data relate to 0–10 cm, 10–20 cm or 20–30 cm. This is important to avoid misinterpretation of soil acidity status.

Any constructed data should be clearly flagged in the user interface. Several platform sections currently rely on incomplete grower data, and users need to know when results are based on assumptions rather than actual farm records. This could be addressed using banners, warning icons or tooltips.

Font sizes should be increased across the platform to improve readability. Participants identified this as a usability issue across multiple views.

The organic matter projections may not be accounting for crop removal, which is a significant input. This needs to be confirmed with the dev team and either incorporated into the model or flagged as a known limitation in the UI.

ROI and cashflow should also be reconsidered as prominent dashboard elements. Participants indicated that these are not primary drivers of liming decisions. The platform should prioritise pH, aluminium, paddock ranking, lime requirement, reapplication timing and practical implementation, with financial metrics presented as supporting information only.

1.6.3 Next steps for platform development

Future development should expand interactivity in the farm map. Paddocks should be clickable directly from the homepage map so users can open paddock-level details without relying only on dropdown menus. Paddock boundary outlines should also be considered when zoomed into an individual farm, although they may not be practical at broad overview scale where farms can be widely dispersed.

The platform should use graphs where they better support interpretation. Participants expressed a preference for graphs over charts for some types of data. For example, soil pH change over time may be best shown as a line graph, while paddock comparisons may be better shown through ranked lists, maps or tables.

Yield outputs should be reframed carefully. Participants felt that the yield model should not be presented as a definitive prediction because many factors influence yield. It should instead be described as an indicative response or ROI indicator, with clear assumptions and caveats. The scenarios graph showing pH change over time should be developed further because participants saw value in using it to identify when lime may need to be reapplied. Labels or prompts such as “likely reapplication window” could help growers translate model outputs into practical lime plans.

Soil organic matter and carbon sequestration functionality may be valuable in future, particularly for growers exploring carbon opportunities. However, this should only be developed further once the model accounts properly for crop removal and other key drivers. The project should prioritise grower logins and one-on-one review sessions. Participants noted that the platform would be more meaningful when they could view their own data. The

next stage should include collecting missing datasets, providing growers with individual access, and using review sessions to validate assumptions, outputs and usability.

1.7 Grower Workshop 3- Individual Grower Feedback Sessions: Liming Tool Review

Individual grower feedback sessions were held to review the liming tool with growers using their own farm data where available. The purpose of these sessions was to understand how growers responded to the live platform, what parts of the tool were useful, what issues needed fixing, and what features should be considered for future development.

1.7.1 Overall Grower Response

The overall response from growers was positive. They found the platform layout clear, easy to understand and well set out, even when seeing it for the first time. This is important because the tool needs to help growers make practical liming decisions without adding unnecessary complexity. The feedback suggests that the platform is heading in the right direction and that growers can follow the main structure without needing too much explanation.

1.7.2 What Worked Well

Growers responded strongly to the visual and paddock-level features of the platform. The pH colour coding and map presentation were well received because they made it easy to see the severity of soil acidity across paddocks at a glance. The ranked paddock list was also seen as useful because it helped growers quickly identify which paddocks needed attention without having to scan the whole map. These features helped turn soil test data into a clearer priority list for action.

The scenario view was also valued by growers, particularly because it allowed them to compare long-term liming outcomes over a 20-year period. Growers found this genuinely useful because liming is a long-term investment and they need to understand how different strategies may perform over time. The ROI display, shown in both graph and table format, was considered clear and easy to read. The cash flow graph was also useful because it showed when lime applications caused dips in cash flow, helping growers understand the timing of financial impacts.

Growers also liked the export function, which allows data to be downloaded into a spreadsheet directly from the platform. This is useful because many growers and advisers still work with spreadsheets when reviewing farm decisions. The soil properties graphs, including exchangeable aluminium and organic carbon, were also seen as clear and informative. Overall, the feedback shows that growers value the platform most when it helps them see soil problems clearly, compare paddocks and understand the likely impact of different liming strategies.

1.7.3 Issues to Fix Now

The sessions identified several practical issues that need to be fixed before broader use. One technical issue was that map markers moved away from their correct GPS point when users zoomed in or out. A session timeout issue was also identified, with users being automatically logged out after around 17 minutes. This interrupted one of the grower sessions and was noted as an urgent issue, although the report records that it has since been fixed. Some data setup issues were also identified. All growers raised the need for clearer soil depth labels. Graph readability also needs improvement, with graph lines and axis labels described as too light and difficult to read. The platform should use darker and bolder graph lines and labels, especially for smaller or lower-contrast screens.

The sessions also identified labelling and data completeness issues. The soil properties dropdown was labelled “Farm” even though it was selecting a paddock, so the label should be changed to “Paddock”. For growers with more than one farm, the platform may need a two-step selector: first farm, then paddock.

1.7.4 Future Roadmap

Several suggestions were raised for future development. Growers suggested that the platform should show separate views for the best financial result and the best soil pH improvement result. At the moment, the scenarios page highlights the strategy with the best NPV, but growers noted that the best financial outcome and the best pH outcome may not be the same. Showing both would help growers make more balanced decisions between soil improvement and financial return. Growers also wanted more flexibility in how the pH map and scenarios are displayed.

The feedback also showed that future versions should allow more local control of lime assumptions. The current model assumes one lime pit and an average neutralising value, but some growers use lower-quality on-farm pit lime at high rates. The platform should eventually allow different neutralising values for different lime sources. Growers also asked whether they could create their own lime scenarios, including custom rates and application frequencies. This may be complex to build, but it would make the tool more useful for growers who use local or frequent liming strategies.

1.7.5 Key Lessons from the Feedback

The feedback shows that growers value the platform most when it helps them quickly understand soil pH issues, compare paddocks and assess long-term liming strategies. The most useful features are visual, practical and paddock-focused. Maps, colour coding, ranked lists and scenario graphs help growers move from raw data to decisions more quickly.

The sessions also showed that data quality and clear labelling are just as important as the modelling itself. Incorrect GPS points, unclear soil depth labels, missing paddock names and missing rotation data can reduce confidence in the outputs. Before wider rollout, the project team should make sure grower data is complete, correctly mapped and clearly labelled.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

WA Farm Data Sharing Project demonstrated that secure data exchange, whole-farm modelling and farmer-facing dashboards can be combined to return practical value to growers from their own data. The lime application use case showed that the iLime modelling foundation can be extended from single-paddock, manual analysis to whole-farm, scenario-based decision support.

The project confirmed that technical feasibility and grower trust must be developed together. Extrata provided the secure data exchange pathway, LEAP provided the modelling and data-processing framework, and AxisTech provided a grower-facing route for data onboarding and dashboard delivery. This closed-loop workflow showed how farm data can move from growers to models and back to growers in a way that is structured, permission-based and focused on practical value.

LEAP has developed into a documented, modular and containerised software asset capable of ingesting farm data, validating inputs, filling data gaps where required, running Monte Carlo simulations and returning outputs on soil pH, aluminium, yield, cashflow and cumulative cashflow. The framework can compare multiple liming strategies across paddocks and soil depths over a 20-year analysis period, allowing growers and advisers to consider risk and long-term investment outcomes rather than relying on a single estimate.

Grower engagement and workshops feedback showed that adoption depends on practical relevance. Growers prefer actionable views over simplified statements.

The project also showed that farmer engagement for data-sharing initiatives is challenging and should not be underestimated. Grower engagement depends on a clear explanation of what value the grower receives in return for sharing data. These lessons are important for future Food Agility, DPIRD and GGA projects that seek to use grower data for decision-support tools.

Recommendations

1. Continue developing LEAP as a whole-farm decision-support framework

Future LEAP development should focus on improving the robustness of the modelling pipeline, strengthening input data validation, documenting assumptions, and ensuring outputs remain transparent and explainable to growers. LEAP should also be considered

as a reusable framework for other farm investment decisions where data sharing, modelling and scenario comparison can support better decisions.

2. Maintain secure, permission-based data sharing as a core design principle

The project confirmed that technical data transfer alone is not enough. Growers need confidence that their data is being used for an agreed purpose, transferred securely, and returned to them in a form that creates clear value. Data sharing agreements, clear explanations of data use, and transparent retention and deletion arrangements should remain central to any future new decision-support use cases development and deployment.

3. Improve input data readiness and data quality processes for data related projects

We learnt that required farm data is often fragmented, incomplete or held in different formats across farm management software, spreadsheets and paper records. Future implementation of similar projects should include a clear data-readiness process and a transparent process for handling missing or incomplete data before modelling begins.

4. Strengthen the dashboard around practical grower decisions

Any grower faced dashboard development should focus on helping growers answer practical questions quickly. Growers generally need dashboards that are simple, spatial, paddock-focused and easy to interpret.

5. Present model outputs as decision support, not fixed predictions

Modelling outputs should be communicated as decision-support information rather than definitive predictions. Future reports and dashboards should clearly explain the assumptions behind modelled outputs, including when results are based on actual grower data, default values or constructed data. Scenario outputs should be framed as likely ranges, comparative options and risk indicators. This will help growers use the information appropriately and reduce the risk of over-interpreting model results.

6. Continue grower and adviser co-design

The project demonstrated the importance of working directly with growers and advisers throughout development. Future such work should continue to use structured feedback sessions, one-on-one grower reviews and adviser input to test whether outputs are clear, trusted and useful for real decisions.

7. Formalise post-project governance, access and maintenance arrangements

For modelling and associated data-sharing workflows to continue beyond the project, clear governance and maintenance arrangements are needed. This includes agreements on IP use, API access, codebase maintenance, dashboard hosting, data transfer responsibilities, service support and future development priorities.

8. Focus future adoption on clear grower value

Future adoption of such tools will depend on whether growers can clearly see the value of sharing their data. The value proposition should be practical and direct: growers provide their own farm data and receive customised, whole-farm decision support that

helps them prioritise paddocks, compare strategies, understand risks and make better investment decisions.

NEXT STEPS

The next phase should focus on converting the demonstrated workflow into a reliable and trusted post-project pathway. The most practical scale pathway is through trusted farm management platforms and grower group extension channels. GGA need to investigate the use of the dashboard by farmer advisers (consultants, agronomist, resellers (CSBP & Summit), another service they can offer their clients. Agtech providers can make the workflow familiar to growers by embedding outputs in systems they already use, while DPIRD and partners continue to develop science-backed APIs and transparent decision logic. This includes refining the dashboard from additional grower feedback, formalising operating arrangements between partners and identifying scale opportunities where the LEAP/Extrata architecture can support additional decision-support use cases. Future development should include export options that allow growers and advisers to use outputs in practical farm workflows. This may include paddock reports, adviser summaries, machinery-ready files, variable-rate application layers and outputs that can be shared with contractors or farm business partners. DPIRD and GGA should identify future use cases, the LEAP workflow should be considered for other whole-farm decisions such as soil amelioration, nutrient management, crop rotation, machinery investment, insurance, valuations and lending where trusted data exchange and modelling can return clear value.

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PUBLICATIONS LIST

Balwinder Singh, R. Pires, M. Antulov, M. Condry, A. Lacey, W. Lawrence, J. Easton and A. Sparks. 2024. LEAP - optimising whole farm lime application as a use case to demonstrate the benefits of farm data sharing. Australian Agronomy Conference proceedings.

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Grower Group Alliance. Meet the WA Farm Data Sharing Project team.

https://www.gga.org.au/wa-farm-data-sharing_2/

Grower Group Alliance. Unlocking the value in data. https://www.gga.org.au/wa-farm-data-sharing_3/

Grower Group Alliance. The Great Lime Conundrum. https://www.gga.org.au/wa-farm-data-sharing_4/

Grower Group Alliance. Bringing a trusted data agent to your corner.

https://www.gga.org.au/wa-farm-data-sharing_5/

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ACRONYMS & ABBREVIATIONS

Acronym	Full Form
API	Application Programming Interface
CBH	CBH Group
CRC	Cooperative Research Centre
DPIRD	Department of Primary Industries and Regional Development Western Australia
EZI	Esperance Zone Innovation Group
FAIR	Findable, Accessible, Interoperable and Reusable
GGA	Grower Group Alliance
GRDC	Grains Research and Development Corporation
HPC	High-Performance Computing
iLime	DPIRD/GRDC lime decision-support app based on Optlime model
NPV	Net Present Value
OKR	Objectives and Key Results
ROI	Return on Investment
WAFDS	WA Farm Data Sharing

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APPENDICES

Figure 1. Current dashboard layout showing farm paddocks and soil sampling locations.

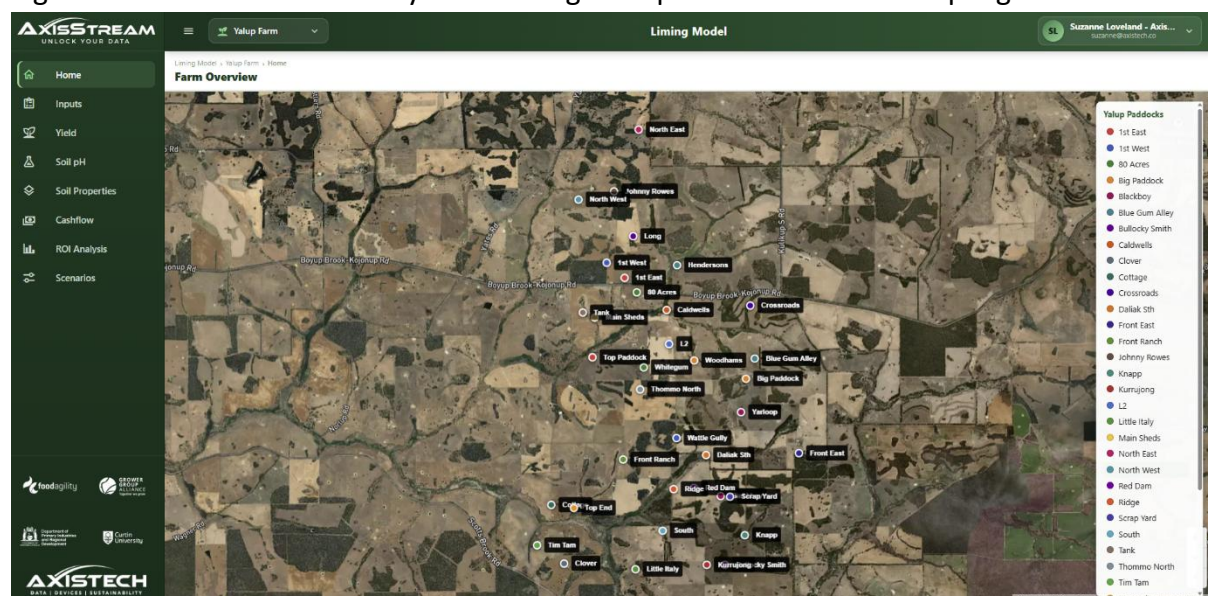


Figure 2. Dashboard presenting spatial variation in soil pH across individual farm paddocks.

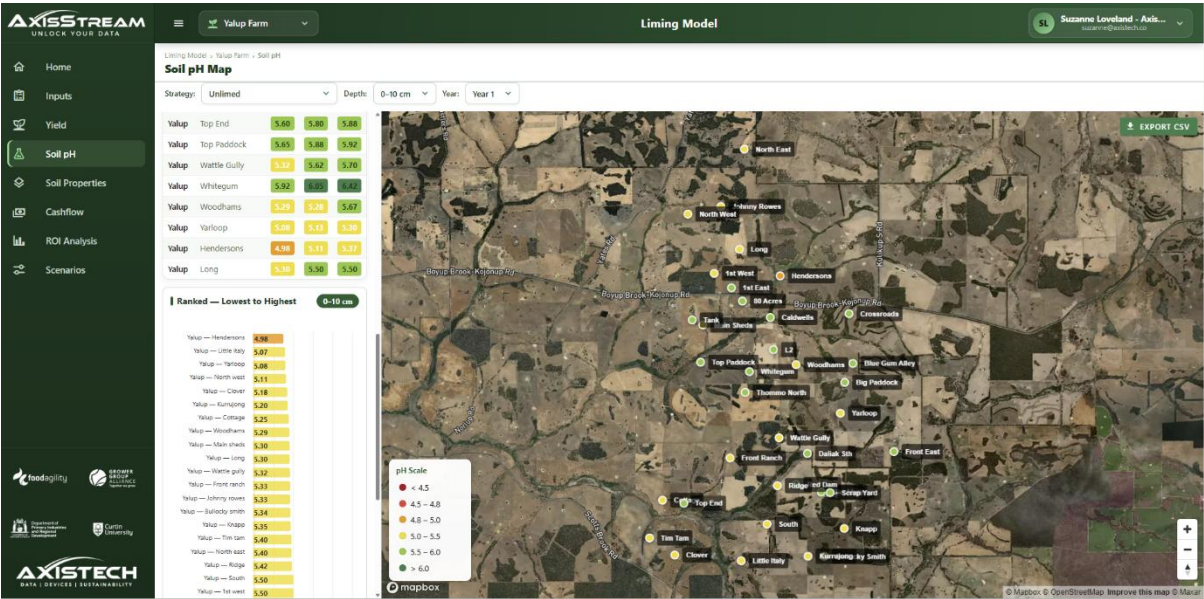
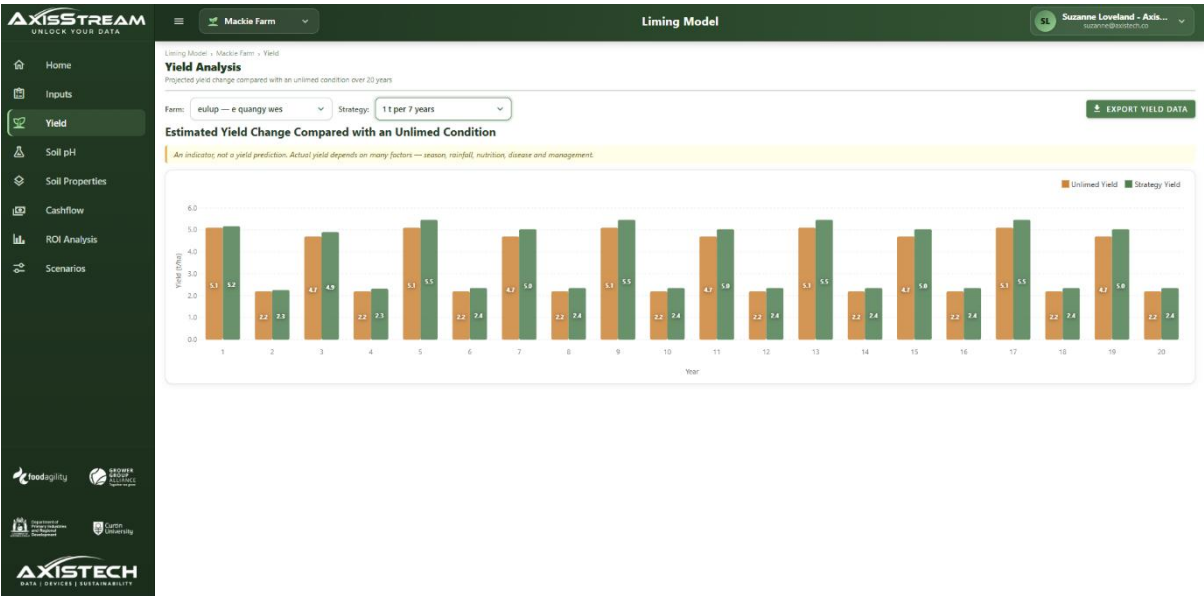


Figure 3. Dashboard displaying crop yield trends for the selected crop rotation under a chosen liming strategy over a 20 year period.



GGA Communications 2021-2026

Action	Date	Channel /Tool	Link	Reach/Engagement
2021				
Update 2 – Meet the WA Farm Data Sharing Project team	11/02/2021	News wire [High-vis GGA/Hub]	https://us8.admin.mailchimp.com/campaigns/show?id=5402014	1180
Project Update 7 - Social Post	1/07/2021	Social-X	https://us8.admin.mailchimp.com/campaigns/show?id=5381550	1126
Article - WA Farm Data Sharing Project Launch	16/08/2021	News wire [High-vis GGA/Hub]	https://us8.admin.mailchimp.com/campaigns/show?id=5384150	1126
Webpage Reporting - WA Data Exchange Project Page	27/08/2021	Social-X	https://twitter.com/GGA_WA/status/1431027160215588864	1225
Webpage Reporting - WA	1/09/2021	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	54

Data Exchange Project Page				
Social Post - Food Agility CRC Retweet	1/09/2021	Social-X	https://www.gga.org.au/activity/wa-data-exchange/	136
Article - WA Farm Data Sharing Project Launch	1/09/2021	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	404
Webpage Reporting - Soft Launch	1/09/2021	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing/	10
Article - WA Farm Data Sharing Project	1/09/2021	News wire [High-vis GGA/Hub]	https://us8.admin.mailchimp.com/campaigns/show?id=5375246	1100
Social Post Milestone for WA Farm Data Sharing Project	20/10/2021	Social-X	https://us8.admin.mailchimp.com/campaigns/show?id=5398718	1146
Social Post - Milestone	21/10/2021	Social-X	https://twitter.com/GGA_WA/status/1450945217201418246	1631

e for WA Farm Data Sharing Project				
Social Post - Update 2 – Meet the WA Farm Data Sharing Project team	21/10/2021	Social-LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:6856710930668118018	264
WA Data Exchange Project Page	17/11/2021	Social-X	https://twitter.com/GGA_WA/status/1460850324491677697	419
Article - From spuds in Peru to WA Farm Data Sharing Project	17/11/2021	Social-LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:6866616034321932288	651
Webpage Reporting - Unlocking the Value in Data	1/12/2021	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing_3/	84
Social Post - Unlockin	1/12/2021	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	83

g the Value in Data				
Article - Seeking 20 more growers for early adopter community	1/12/2021	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing_2/	162
Webpage Reporting - Update 2 – Meet the WA Farm Data Sharing Project team	1/12/2021	Webpage - update/blog	https://www.gga.org.au/activity/wa-data-exchange/	145
Article - WA Farm Data Sharing project perfect for progressive data driven farmers	1/12/2021	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	123
Article - Milestone for WA Farm	15/12/2021	News wire [High-vis]	https://us8.admin.mailchimp.com/campaigns/show?id=5411674	1191

Data Sharing Project		GGA/Hub]		
Webpage Reporting - WA Data Exchange Project Page	17/12/2021	Social-LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:6876751424345145344	524
2022				
Social Post - Soil acidity - liming conundrum	4/01/2022	Social-X	https://us8.admin.mailchimp.com/campaigns/show?id=7908069	1228
Article - To lime or not to lime	1/03/2022	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing_4/	96
Article - Farm Data: who are you going to trust?	1/03/2022	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	43
Social Post - Bringing a trusted data agent to your corner	13/04/2022	Social-X	https://twitter.com/GGA_WA/status/1514000676619182083	1207

Webpage Reporting - WA Data Exchange Project Page	1/06/2022	Webpage - update/blog	https://www.gga.org.au/activity/wa-data-exchange/	75
Social Post - Bringing a trusted data agent to your corner	1/06/2022	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	75
Webpage Reporting - Bringing a trusted data agent to your corner	1/06/2022	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing_5/	43
Webpage Reporting - WA Data Exchange Project Page	1/06/2022	Webpage - update/blog	https://www.gga.org.au/activity/wa-data-exchange/	33
Webpage Reporting - WAFDS	1/07/2022	Webpage - update/blog	https://www.gga.org.au/gga-news/wa-farm-data-sharing_6/	42

Industry Partner Brings Fresh Perspectives				
Update - WA Data Exchange Project Pages (Total of main page and project update pages)	31/07/2022	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	64
Article - WA Farm Data Sharing Industry Partner Brings Fresh Perspectives	15/08/2022	News wire [High-vis GGA/Hub]	https://us8.admin.mailchimp.com/campaigns/show?id=8673061	1264
Article - WA Farm Data Sharing industry partner brings fresh	31/08/2022	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	105

perspectives				
Social Post - Have you seen @AxisTech_IoT has joined @DPIRD WA, @foodagility and GGA's WA Farm Data Sharing project?	30/09/2022	Webpage - update/blog		224
Article - WA Farm Data Sharing industry partner brings fresh perspectives	30/09/2022	Webpage - hi-vis [Tile]	https://www.gga.org.au/activity/wa-data-exchange/	85
Article - The Liming Conundrum	2/11/2022	Social-LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:6897691097447964673	189
Social Post - Soil	2/11/2022	Social-X	https://twitter.com/GGA_WA/status/1491925406529863683	3854

acidity - liming conundr um				
Webpag e Reportin g - WA Data Exchang e Project Page	4/12/2 022	Social-X	https://www.linkedin.com/feed/update/urn:li:activity:6919767382047543297	556
2023				
Newswir e article results	15/02/ 2023	Newswir e [High- vis GGA/Hub]		130922 5
Post	31/05/ 2023	Social-X		
Webpag e reportin g - WA Data Exchang e Project Pages (Total of main page)	30/06/ 2023	Metrics reporting [quarterl y]		13
Newswir e	5/09/2 023	Social-X	https://twitter.com/GGA_WA/status/1698918787855356402	825
Twitter Post	5/09/2 023	Social- LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:7104683440570073088	592
LinkedIn	5/09/2 023	Newswir e [High- vis	https://mailchi.mp/gga/5-sept	10

		GGA/Hub]		
Article - WA Farm Data Sharing Project Update - First data set received from farmer	5/09/2 023	Social-X	https://twitter.com/GGA_WA/status/1698918787855356402	
Article - WA Farm Data Sharing Project Launch	5/09/2 023	Social- LinkedIn	https://www.linkedin.com/feed/update/urn:li:activity:7104683440570073088	
Project Update 7 - Social Post	5/09/2 023	Social-X	https://mailchi.mp/gga/5-sept?e=[UNIQID]	
Farm Weekly DPS	2/11/2 023	Farm Weekly DPS [1/8th page]	https://www.gga.org.au/wp-content/uploads/2023/11/Binder2.pdf	28837
2024				
Mass email to GGA Network	19/07/ 2024	Email - mass email [All GGA members]		
Create content	19/07/ 2024	Newslett er/Mag		

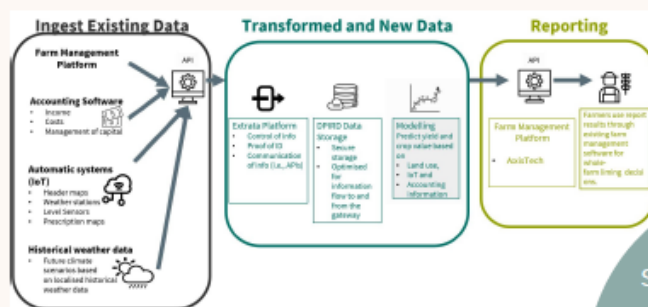
for AxisTech email send		story authoring - 3rd party external		
WA AgTech meetup social post	18/09/ 2024	Social- LinkedIn		
iLime article on website	31/10/ 2024	Webpage - update/b log		
Promote iLime article on LinkedIn	31/10/ 2024	Social- LinkedIn		
Promote iLime article on X	31/10/ 2024	Social-X		
Newswir e - Project Update copy	15/11/ 2024	Newswir e [Med- vis Network News]		
2025				
GGA Project Series: Working together to create an impact	20/06/ 2025	Social- LinkedIn	https://www.linkedin.com/feed/update/urn:li:ugcPost:7341707633160085509/	13
GGA Project	20/06/ 2025	Social-X	https://x.com/GGA_WA/status/1935910511075344882	202

Series: Working together to create an impact copy				
Update Website timeline & team	28/11/ 2025	Collateral [Canva- flyer/tile etc]		
2026				
Farmer feedback session screensh ot	31/07/ 2026	Social- LinkedIn ,Social- FB,Social- X		
Project close out outcome s	31/07/ 2026	Collateral [Canva- flyer/tile etc]		

WA Farm Data Sharing Liming Optimisation Project

About Us

The WA Farm Data Sharing (WAFDS) project aims to help growers make more sophisticated investment decisions using their **own farm data**. It will assist growers to understand ROI for on-farm liming decisions.



Seeking expressions of interest from growers to participate in this project

Contact Alison Lacey
0429 084 421



Scan me for further information or contact:

Alison Lacey alacey@gga.org.au

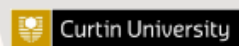


Figure 4: Early Flyer utilised for promotion at grower group field days, digital tech days and Dowerin Machinery Field Days

WA Farm Data Sharing Project

By Balwinder Singh, Rodrigo Pires, Matthew Antulov, Michelle Condry, Alison Lacey, Suzanne Loveland,
Wes Lawrence, Julia Easton and Adam Sparks
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Project no: FA099



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