LOWER EP AG EXPO

8 March 2022

Ungarra Sports Complex

AIR EP
Ag Innovation & Research
Eyre Peninsula

Managing high input costs

Bendigo Bank

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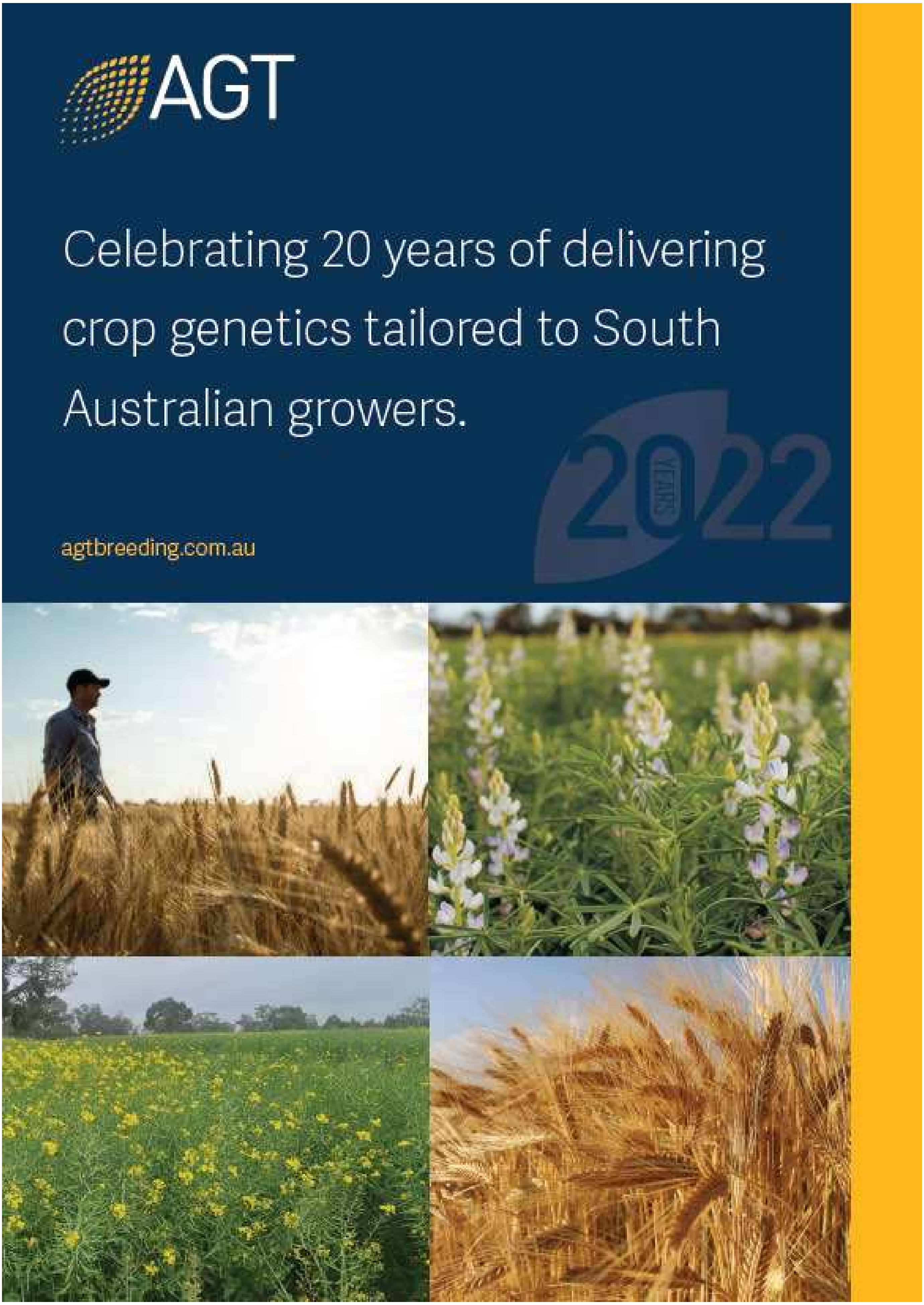
Contents

Program

TIME	TOPIC	SPEAKER
8.30am	Registrations open	
8.50am	Welcome, AIR EP Update	Naomi Scholz, EO AIR EP
9.00am	Global input costs and grain markets	Wes Lefroy, Rabobank
9.20am	Nitrogen input strategies	Therese McBeath, CSIRO
9.50am	Variable rate phosphorous strategies	Sam Trengove, Trengove Consulting
10.20am	MORNING TEA	
10.50am	Pulses in rotation	Jason Brand, Agriculture Victoria
11.20am	EP trial results + GM Canola	Andrew Ware, EPAG Research
11.50am	Panel session – experiences with variable rate	Dan Adams, Brayden Calderwood, Sam Trengove Facilitator: Andrew Ware
12.10pm	Evaluation and close	Naomi Scholz, EO AIR EP
12.20pm	LUNCH	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Welcome

John Richardson

Chair, AIR EP Medium Rainfall RD&E Committee

Welcome to the second Lower EP Ag Expo hosted by the AIR EP Medium Rainfall RD&E Committee, carrying on the tradition of LEADA events with the aim to bring you the latest agricultural information relevant to your farming systems.

The merger of LEADA and EPARF to form AIR EP has so far been successful, in that the AIR EP Board members are dealing with the administration and governance requirements of running a not-for-profit organization, while the RD&E Committees can get on with the job of identifying and scoping out issues affecting their production, profitability and resilience, as well as reviewing current project progress and assisting with event planning.

I'd like to take this opportunity to thank past LEADA Committee members and staff for building the organization to the point where we are well placed to continue to attract RD&E investment for the benefit of Lower EP farmers.

Some of the activities of the past 12 months included:

- GRDC Frost workshop at Cummins on 17 March 2021
- AIR EP Lower EP Spring Crop Walk on 2 September 2021, where 60 people attended and visited sites to look at rhizobia trials for beans and chickpea, Resilient EP soil moisture project (including nitrogen management, long coleoptile wheat, seed priming), hyper yielding canola, canola variety performance, deep ripping and pulses on sands, and pasture and forage species.
- AIR EP Members Day Post Emergence Herbicide workshop with Mark Congreve at Ungarra on 21 June.
- GRDC Pulse Field Day at Tooligie on 5 October 2021.

Please ask lots of questions and be honest in your feedback to help us shape future events, and most of all enjoy the day!!

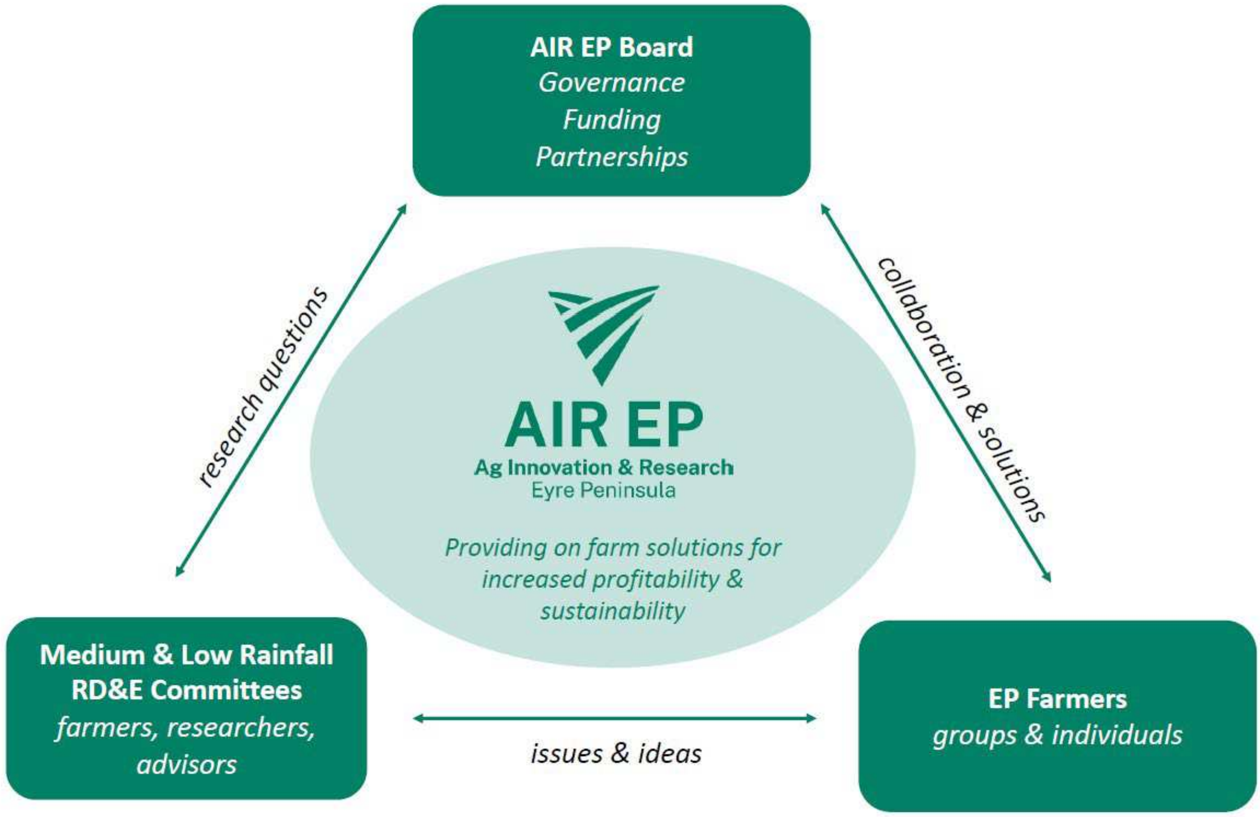
What is AIR EP?

Formation
Agricultural Innovation & Research Eyre Peninsula (AIR EP) was officially incorporated on 26 May 2020, with the aim of creating a single entity for farmer driven applied research, local validation and extension of agricultural technologies and innovations on the Eyre Peninsula.

The vision for AIR EP is a professional farmer owned and directed organisation that drives the advancement and practical application of agricultural scientific research, development and extension in dryland farming systems relevant to Eyre Peninsula and like environments across Australia.

The organisation will access funds to support projects that address key issues and opportunities that will increase the profitability and resilience of farming businesses in the region.

Structure
The AIR EP Board provides governance oversight and sets the strategic direction for the organisation. The Board is supported by two RD&E Committees, one with a focus on the medium rainfall zone (lower EP) and one on the low rainfall zone (upper EP). These committees focus on setting priorities for RD&E investment in the region, reviewing projects and providing input into events for farmers.



AIR EP Board Members
Bryan Smith (Chair), Andrew Polkinghorne, Bill Long, Ken Webber, Greg Scholz (LR RD&E rep), John Richardson (MR RD&E rep), Greg Arthur, Mark Stanley (special skills).

AIR EP Medium Rainfall RD&E Committee
Covers lower and parts of Eastern Eyre Peninsula and comprises John Richardson (Chair, AIR EP Board member rep), Dan Adams, George Pedler, Billy Pedler, Dustin Parker, Denis Pedler, Lochie Siegert, Brett Masters, David Davenport, Jake Giles, Daniel Puckridge with the support of Andrew Ware (EPAG Research), Amy Keeley (SARDI), Ben Smith (EP Landscape Board), Ken Webber (AIR EP Board) and GRDC staff.

Staff
Executive Officer - Naomi Scholz, Finance Officer - Alanna Barns, Regional Agricultural Landcare Facilitator - Amy Wright, Sustainable Agriculture Officer - Josh Telfer.

2022 Focus

AIR EP is leading the 'Resilient EP' project, where new and emerging technologies will be used to assist farmers make efficient use of soil moisture. The Eyre Peninsula has an extensive soil moisture probe network which has been underutilised. A Regional Innovators group of farmers and advisers are engaging researchers and linking with the region's farmers to develop techniques to integrate information generated from the probe network, satellite imagery, climate and yield models. Farmers will be able to make more informed, timely decisions underpinned by innovations in agronomy and livestock management in order to optimise the region's productive potential whilst protecting soil and water resources in a changing climate. This project is funded by the Australian Government's National Landcare Smart Farming Partnerships Program, and we are partnering with CSIRO, Regional Connections, SARDI, Square V and EPAG Research to deliver this exciting and ambitious project.

AIR EP is also excited to be partnering with SAGIT and EPAG Research to improve the capacity of grains research, development and extension in the Eyre Peninsula region by annually engaging a recent graduate to work as an intern – this program will expose a new graduate to a wide range of opportunities and experiences across EP and beyond.

AIR EP are partners in the recently formed SA Drought Hub, bringing opportunities for farmers, the agricultural industry and local communities to improve their resilience to drought through planning, training and promotion of improved agronomic and livestock practices, as well as farm business management and new innovations in agriculture.

AIR EP has a range of other projects that will be occurring in 2022 including:

- Delivery of the EP Landscape Board's Sustainable Agriculture Program and Regional Agricultural Landcare Facilitator (RALF) role
- GRDC funded Legume extension project, with research and demonstration sites across EP
- GRDC funded Tactics to minimise impacts of frost
- SAGIT funded Taking South Australian Canola profitability to the next level on lower EP

Contact us
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For more information or to find out about coming events, visit our website **www.airep.com.au**, follow us on Twitter **@ag_eyre**, join us on Facebook **@aginnovationep**, subscribe to our newsletter and **become a member** via the AIR EP website.

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Prices may head north

The Land Article: Wes Lefroy, Rabobank

16 Feb 2022

Decade-high prices and longer-than-usual delivery times have made it a very tough 12 months for both fertiliser importers and farmers.

While global urea (nitrogen) prices have at least started to show some reprieve in recent weeks - falling 40 per cent in US Dollar terms since their peak in late November - there is another storm threatening to strike, potentially pushing fertiliser prices north once again.

The concern about Russia invading Ukraine has been growing for some time.

While this may primarily lead to a large-scale humanitarian crisis, there is also the possibility of major shocks to agricultural markets - including fertilisers.

The first potential concern is a major interruption to global fertiliser supply and trade flows.

Russia alone is responsible for 46pc of global ammonium nitrate (also used for mining), 23pc of ammonia, 14pc of urea and 14pc of mono-ammonium phosphate (MAP) exports.

If we add Belarus to the equation, for potash (potassium), the global export share increases to a hefty 40pc.

While Australia imports little from Russia and Belarus - in 2020 it was only about 200,000 tonnes of urea from Russia and 80,000t of potash from Belarus - shifting trade flows may be a cause for concern for our importers.

Brazil is the country likely to be most heavily impacted if tighter sanctions are implemented on fertiliser exports from the region.

Brazil, which is the world's biggest importer of fertilisers, relies heavily on imports of urea, ammonium nitrate, MAP and muriate of potash (MOP) from the region.

If Brazil is forced to change the origin of its fertiliser imports, that may hold challenges for Australian imports - especially considering Australia's purchasing power is lower than that of Brazil.

The second way fertiliser prices may be impacted by this crisis is via the energy market.

Russia is a large supplier of natural gas, which is one of the key raw materials of urea, into Europe.

While gas prices have come off the highs we saw late last year due to a milder-than-normal winter in Europe and improved supply from Russia, further interruptions to EU gas supply would again send prices upwards and threaten the viability of nitrogen production.

So where does this leave Australian growers?

For the time being, as a result of this crisis, we see there is a risk of fertiliser prices rising higher than our current base case forecast, which is to see a slow easing of global urea prices until the middle of the year.

Due to procurement and ocean freight times, this may take three to four months to flow through to the local market.

For phosphate prices, the picture is not as nice.

We think it is unlikely that we will see any significant downside in phosphate prices until China re-enters the export market, which is expected to be at the end of the first half of 2022.

As for margins, escalation of tensions between Russia and Ukraine would also increase prices of grains and oilseeds, potentially limiting damage to margins to some degree.

SOURCE: https://www.theland.com.au/story/7621758/question-posed-about-whether-fertiliser-markets-can-get-even-uglier/

Rabobank

Nitrogen strategies for Eyre Peninsula

Therese McBeath[1], Peter Hayman[2], Andrew Ware[3], Jacob Giles[3], Bonnie Flohr[1], Murray Unkovich

CSIRO, SARDI, EPAG Research

Key messages

- The Lower Eyre Peninsula environment has a unique combination of soils and climate that challenge a 'one size fits all' approach to nitrogen management.
- Some gaps in our knowledge include our ability to predict nitrogen losses and mineralisation in this unique environment.
- We are currently working on a proof-of-concept model for predictions for Eyre Peninsula environments.
- Recent efforts that improve our ability to predict soil water and yield potential can be useful for nitrogen management.
- In-season strategies need to be tailored to our knowledge of soils and yield potential.
- Many growers are seeking a more strategic approach to nitrogen management that reduces the reliance on in-season tactical decision making.
- We are exploring approaches that combine legume and fertiliser management to better 'bank' nitrogen.
- We will discuss what all this means for the 2022 growing season.

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Project Delivery Partners

An informed approach to phosphorus management in 2022

Sam Trengove[1], Stuart Sherriff[1], Jordan Bruce[1] and Sean Mason[2]
[1]Trengove Consulting, [2]Agronomy Solutions.

Key messages

- Opportunities are available for reformed phosphorus (P) rates under high fertiliser prices, but background knowledge is key.
- Gross margin analysis with P application rates is sensitive to soil available P, yield potential, fertiliser, and grain prices.
- On phosphorus responsive soil types return from fertiliser (P) investment is normally greatest and most stable with cereal phases.

Why do the trial?
Fertiliser prices for P inputs have more than doubled since those used for the start of the 2021 season and for a three-year rolling price average. Currently these high fertiliser prices are coupled with high grain prices which offsets potential decreases in partial gross margins but in the current global scenario there is high uncertainty if grain prices will hold until the end of 2022.

Higher inputs costs will naturally generate a mindset of simply reducing these input rates, but it is important to have background knowledge supporting these decisions so yield returns aren't compromised. Combined with high fertiliser prices there have been the observations that P replacement programs have been inadequate in meeting phosphorus demand in some soil types.

This paper aims to outline gross margin scenarios under a range of fertiliser and grain prices which could be vastly different to those set up in previous seasons. Importantly, the gross margin analysis will be performed using a range of different background P levels, soil type characteristics and yield potentials. Identification of likely paddock responsiveness and the variability in that response across the paddock is important. Several tools are available to assist with this determination which will be explained.

How was it done?
Through various research projects across the last 10 years both Agronomy Solutions and Trengove Consulting have obtained over 50 replicated field trials across the broadacre regions of South Australia, with most of them (> 40) being within the last 5 years. Most of these trials have assessed wheat and barley responses to P applications across a range of soil types. This dataset is highly valuable to assess gross margin scenarios under a range of conditions and the accuracy of various data layers in predicting P requirements.

For this paper, we have used the P rate which is associated with the greatest partial gross margin (PGM) return when factoring in fertiliser prices and returns from grain yields. This is calculated by fitting grain yield response curves derived from the P rate trials. We have used this dataset to test the accuracy of various data layers in predicting PGM under current conditions and from the most accurate data layers looked at the effect of changing fertiliser to grain price ratios for expected 2022 scenarios. Determination of PGM has used recent price trends of MAP at $1250, Wheat (APW) at $400 and Barley (F1) at $295. This dataset is concentrated in the Yorke Peninsula and Mid North regions of South Australia but is applicable to wider regions where soil types vary in alkalinity within paddocks driven by the presence of carbonates.

What happened?

Current soil P levels

Reviewing the large soil test database from PROC9176604 reveals the overall P status of the broadacre cropping regions of SA and VIC. Over 1300 soil surface samples were collected in 2019 and 2020 with both Colwell P and DGT P levels placed in deficient, marginal, and sufficient categories (Table 1) based on published data (Moody 2007, Mason et al 2010). The PBI value for each site was used to determine a critical Colwell P position. Over half (52%) of sites were above critical DGT levels and as much as 73% of sites were sufficient in P using Colwell P. Using these soil test results to make a P recommendation for the sites sampled, shows that there are between 73% and 83% of sites that require < 10 kg P/ha to maximise yields. This proportion of sites is similar to what has been observed in the trial series associated with SAGIT project TC119 and TC221 discussed below.

Table 1. Soil P test results (Colwell P and DGT P) through the southern broadacre cropping region sampled in 2019 and 2020 placed in deficient, marginal, and sufficient categories with associated determinations of required P rates to maximise yields.

		Sufficient	**Marginal**	**Deficient**	
		0 kg P/ha	**0-5 kg P/ha**	**5-10 kg P/ha**	**> 10 kg P/ha**
Colwell P	Number of sites	970	68	72	218
	% Split	73	5	5	16
DGT P	Number of sites	685	113	163	367
	% Split	52	9	12	28

Site soil characteristics driving P responses

The intensive field trial dataset produced by Trengove Consulting from 2019 to 2021 (SAGIT projects TC119 and TC221) where 33 replicated field P response trials have been established on various soil type x NDVI/grain yield zones is a powerful tool to test multiple data layers, including Colwell P and DGT P as discussed and other accessible data layers such as NDVI, pH and Yield.

Of the 33 sites, 64% recorded non-significant ($p > 0.05$) responses to applied P (Table 1), leaving 12 with positive responses. Of these 12 responsive sites, at current prices the average P rate required to maximise PGM was 20 kg P/ha which highlights the continued importance of identification of P responsive soil types. Responsive soil types are characterised by soil pH ($CaCl_2$) between 7.5-7.8, higher PBI values (P retention) driven by the presence of soil carbonate and low comparative NDVI values (Table 2).

Table 2. Summary of soil characteristics averaged across the 12 responsive P sites compared to 21 nonresponsive sites through Yorke Peninsula and Mid-North regions of SA. PGM was calculated based off MAP at $1250, Wheat (APW) at $400 and Barley (F1) at $295.

Response category	**Number of sites**	**P rate at max PGM (kg/ha)**	**pH ($CaCl_2$)**	**Colwell P (mg/kg)**	**PBI**	**DGT P (ug/L)**	**Colwell P/PBI**	**pHnNDVI**
Significant (0.05) (response to P)	12	20	7.56	28	91	26	0.42	9.3
Non-significant (0.05) (no response to P)	21	0.3	6.61	45	60	94	0.91	6.6

Relationships between the P rate at maximum PGM at each trial site and several data layers were used to find the layer(s) that most accurately predict P responsiveness at each site. Of the soil P tests, DGT P (R^2 = 0.72) was superior to Colwell P alone (R^2 = 0.44), at identifying sites where high P rates would produce high PGM's at current pricing and where reduction in P rates would not cause a decrease in PGM (data not presented). However, where Colwell P is combined with PBI (Colwell P divided by PBI) the Colwell P relationship improves to R^2 = 0.73, highlighting the importance of including PBI with Colwell P interpretation and measuring PBI at the same or similar intensity as Colwell P if that soil test is used for soil P mapping.

The most accurate combined data layer to provide a P rate requirement for max PGM was an index of the soil pH and NDVI at approximately GS30 (figure 1). The index divides soil pH with the NDVI normalised to the paddock average. Areas that have high pH and low NDVI are typically highly P responsive, the level of response declines as pH decreases and historical NDVI at GS30 increases. The higher soil pH coupled with poor early vigour (low NDVI) occurs in the presence of soil carbonate, higher PBI values and lower residual P. The index is yet to be tested on soil types where high PBI is driven by other soil attributes such as Al or Fe, where there is a tendency of soil pH to be < 6 in these soils (e.g., Ferrosols on Kangaroo Island). For these areas a normalised NDVI index alone could be appropriate, or if pH is still an important factor, combining the data layers in a different index such as pH * nNDVI, where the lower values are more likely to be responsive to P however, this needs further investigation. A case study of a paddock associated with the SAGIT project TC221 using this method is presented later in this paper.

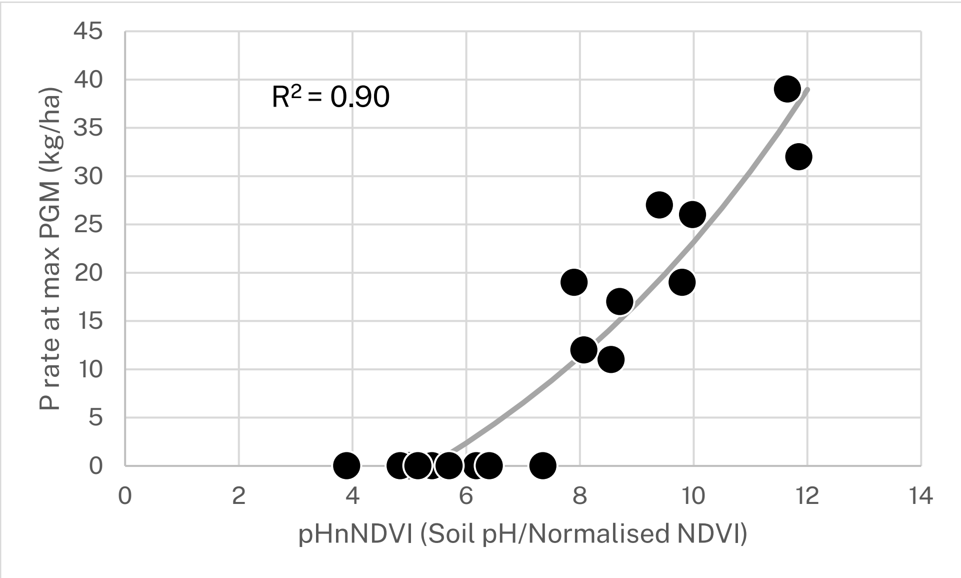


Figure 1. Relationship between the P rate associated with max PGM for P response trials (2019-2021) pHnNDVI.

Partial gross margin analysis for fluctuating fertiliser and grain prices

While there is some clarity with fertiliser prices for the 2022 season there is difficulty in predicting the grain price towards the end of 2022. At current grain prices the identification of P responsive sites still pays but what happens if grain prices fall? Using an accurate data layer (DGT P or pHnNDVI) we can present the influence of changing fertiliser and grain prices on optimal P rates for max PGM (Table 3). Based off 2021 fertiliser prices as a comparison and expected 2022 prices this analysis suggests economic P rates will be slightly less than half of that required in 2021.

Table 3. Sensitivity analysis of optimal P rates required for max PGM (kg/ha) for moving MAP prices at three decile grain prices (1, 5, 9) using either the pHnNDVI index or DGT P as a guide of deficiency (see figure 1). Grain price deciles from 2010 onwards, source: Mercado.

Decile 1 Grain prices: Wheat (APW1) - $214t, Barley (F1) - $165

MAP ($/t)	pHnNDVI					Soil DGT P				
	4	6	8	10	12	> 150	100	50	30	< 20
$500	0	3	11	19	28	0	4	16	28	40
$750	0	1	7	13	19	0	3	12	21	30
$1,000	0	1	5	10	14	0	2	9	16	24
$1,250	0	0	4	7	10	0	1	7	12	18
$1,500	0	0	3	5	7	0	1	5	9	13

Decile 5 Grain prices: Wheat (APW1) - $275t, Barley (F1) - $230

MAP ($/t)	pHnNDVI					Soil DGT P				
	4	6	8	10	12	> 150	100	50	30	< 20
$500	0	5	16	26	36	0	6	20	34	47
$750	0	2	10	18	25	0	4	15	26	38
$1,000	0	1	7	13	19	0	3	12	21	31
$1,250	0	1	6	10	15	0	2	10	18	25
$1,500	0	1	4	8	12	0	2	8	14	21

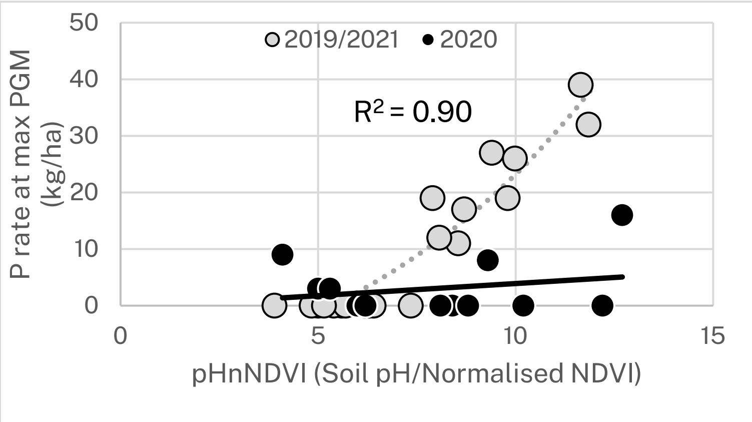
Decile 9 Grain prices: Wheat (APW1) - $332t, Barley (F1) - $293

MAP ($/t)	pHnNDVI					Soil DGT P				
	4	6	8	10	12	> 150	100	50	30	< 20
$500	0	8	20	31	42	0	9	23	37	51
$750	0	3	12	21	31	0	5	18	31	44
$1,000	0	2	9	16	24	0	3	14	25	36
$1,250	0	1	7	13	19	0	3	12	22	31
$1,500	0	1	6	11	16	0	2	10	18	26

Opportunities for 2022 – Time of Sowing (TOS)

Recent SAGIT funded project (AS216) outlined the effect of TOS on P requirements through trials established on P responsive sites between 2017 and 2018 due to the prevalence of earlier sowing times. Results outlined that if adequate soil moisture was present in April for sowing, P rates can be reduced without any impact on yield. This benefit diminished if either there was low moisture in April or sowing times moved to mid-May and beyond, with June sowing times producing linear but relatively flat uneconomic responses. Under high soil moisture and warm temperatures crop root systems develop effectively and therefore exploration of residual P is high, placing less reliance on fertiliser P inputs. Diffusion rates of P in these conditions are also optimised. Data from Trengove Consulting supports this theory as the 2020 field trial data set, sown early May under good moisture revealed a lower pHnNDVI with optimal P rate relationship (figure 2) compared to 2019 and 2021 with dryer conditions and later sowing (table 4). This is a potential option for 2022 if wet conditions in April prevail.

Figure 2 and Table 4. Influence of high rainfall and high soil moisture at the 2020 sites compared to 2019 and 2021 and the impact of lower P requirements at P deficiency indices.



Site	Year	Rainfall to May (mm)	Rainfall for April (mm)
Koolunga	2019	13	4.4
Bute	2019	9.1	3.2
Brinkworth	2020	180	64
Bute	2020	119	67
Kybunga	2020	154	78
Crystal Brook	2021	29	2.6
Spalding	2021	43	4.4
Hart	2021	42	10

Case study

One paddock included in the trial series associated with the SAGIT project TC221 is located at Crystal Brook in the Mid North of South Australia. This paddock was selected to be part of the SAGIT project to evaluate the methodology of predicting P response using data layers and investigate a range of long-term P management strategies. Two data layers that are readily available were used to predict the P response at four sites in the paddock and P rate trials were established. The data layers used included, pH (calibrated to $CaCl_2$) captured using a Veris pH mapping machine, taking approximately 8 samples per ha, and satellite imagery captured at approximately GS30 in a wheat crop in 2020 (Figure 3). These two data layers were used to calculate the pHnNDVI (as explained above) to identify four trial sites with different predicted P responsiveness. This process was repeated at a paddock at Hart and Spalding. A similar process was used in 2019 and 2020 to select sites in the previous SAGIT funded project TC219 to predict the P response across five paddocks.

At each of the four sites in each paddock a P rate response trial was established with rates of P up to 90 kg/ha (409kg MAP/ha). Very high rates of P are required to find the maximum yield on very high P demand sites. In the previous project the maximum rate was 50kg P/ha, and some sites were still responding even at this level. At the site which was predicted to have the largest response a larger trial was established to investigate long-term (3 year) management strategies. This site included two treatments where 75kg of P was broadcast in front of the seeder either as MAP or Chicken litter, these treatments also had 15kg P/ha as MAP applied in the furrow at seeding.

The grain yield response at each of the four sites in the paddock at Crystal Brook is shown in Table 5. The sites with low predicted P response (22 and 24) did not have any response to P fertiliser, the nil treatments produced the same amount of grain yield as the 90 kg P/ha treatments. At the site which was expected to have a moderate response there was also no response to P fertiliser. At this site there was significant variation in soil test results between replicates, with DGT-P soil test levels ranging from 38 in rep 1 to 151 in rep 3. This level of variation explains why this site did not have a significant P response even though it was expected and highlights short scale variability that can be difficult to map and manage. At site 25, the most responsive site, significant yield responses were observed all the way up to 90 kg P/ha, indicating a highly P responsive soil. This is not to suggest that these rates were economic, for a current pricing scenario of $1,250/t for MAP and $295/t for barley 32kg P/ha (145kg MAP) was required to maximise partial gross margin at site 25. The treatments that had 75kg P/ha broadcast in front of the seeder followed by 15kg P/ha below the seed, produced similar grain yield to the standard 90 kg P/ha applied below the seed. This suggests that the broadcast P was readily available. In previous trials this has not been the case, and this needs further investigation.

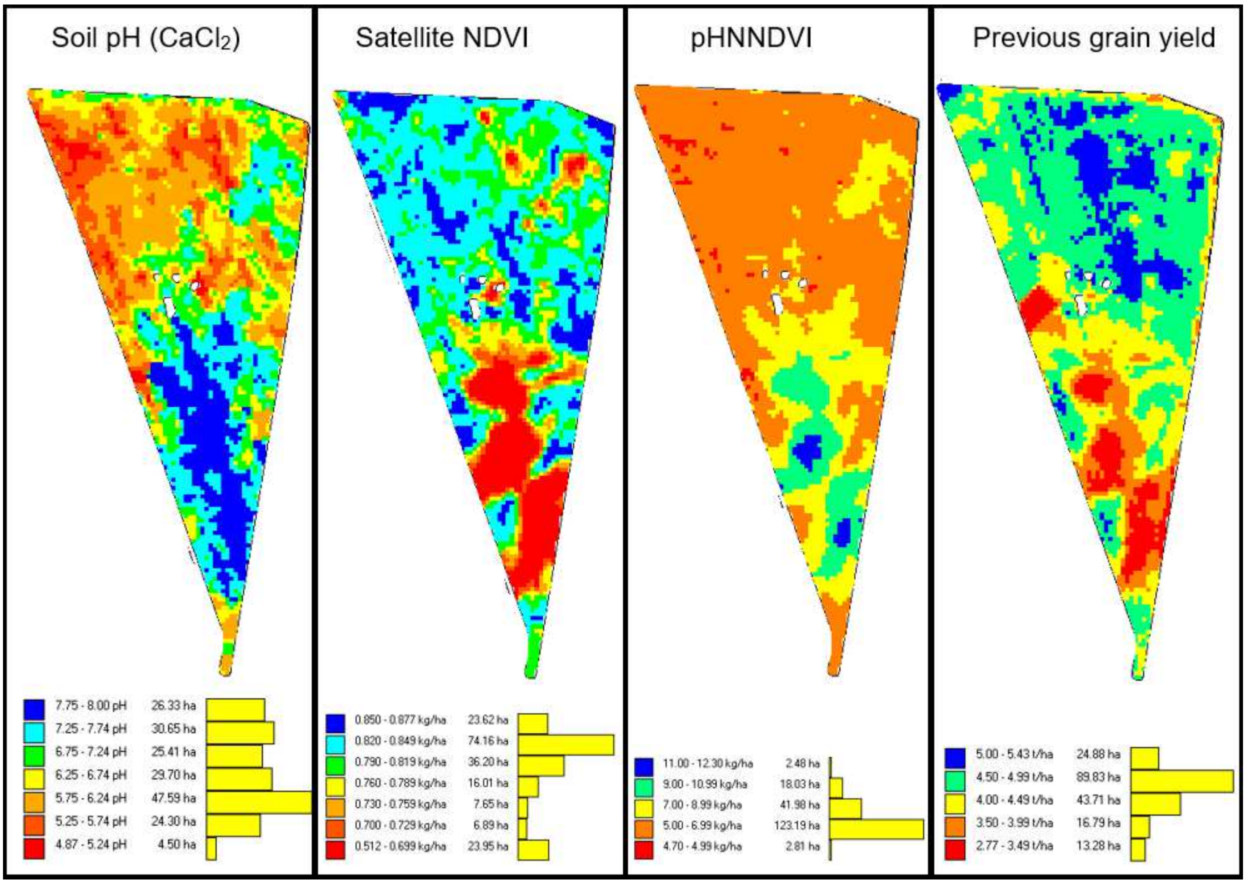


Figure 3. Soil pH, Satallite NDVI of wheat crop in 2020, approximately GS30, calculated pHnNDVI (pH / normalised NDVI) and historical grain yield for a paddock at Crystal Brook.

Table 5. Grain yield (t/ha) for the four P rate response trials at Crystal brook in Compass barley in 2021, treatments with different letters are significantly different with in a site where the P value is < 0.05.

Site	22	23	24	25	
Expected response	Low	Moderate	Low	High	
P rate (kg/ha)					
0	2.70	4.32	3.98	2.71	f
7.5	2.47	4.36	3.83	3.41	e
15	2.77	4.44	3.78	3.84	d
22.5	2.51	4.38	3.58	4.10	c
30	2.56	4.35	3.64	4.22	c
50	2.94	4.44	3.65	4.54	b
90	2.73	4.31	3.54	4.74	a
CL				4.75	a
Spread MAP				4.75	a
P value	0.318	0.946	0.155	<0.001	

The yield data from the four trials in isolation is useful for measuring site specific responses within a paddock. But it becomes more powerful when a response curve is generated for each of the 33 sites, and these are put into a database to generate response curves based on the data layers used for site selection. From this database we can predict the P response based on pHnNDVI for each of the sites and use that data to generate partial gross margins. This can then be extrapolated to every point in a paddock to generate a P fertiliser application map.

Table 6 shows the results from four modelled scenarios where high grain prices are coupled with a range in MAP prices and different fertiliser strategies. In scenario 1 using MAP fert price of $750/t, the optimum P rate ranges from 0 to 200 kg MAP/ha, averaging 44 kg/ha for the paddock. Increasing fert price to $1,500/t in scenario 2 reduces the average MAP rate to 24 kg/ha.

In some scenarios, we may prefer to ensure that all areas receive a minimum rate of starter fert, rather than receiving nil in the areas that are predicted not to be P responsive. In scenario 3 the minimum fert rate is set to 20 kg MAP/ha, so that no zone receives less than this. This increases the average fert rate for the paddock from 24 to 32 kg MAP/ha.

Scenario 4 is an example of a long-term strategy, where the minimum fert rate for any given area is set by calculating P replacement based on the previous year's yield map. This strategy ensures P reserves are not being 'mined' on any soil, but being maintained on non-responsive soils, with higher rates still targeted to the P responsive soils. Each location receives whichever of the two rates is higher, the rate calculated from pHnNDVI or yield replacement. Scenario 4 increases the average rate to 90 kg MAP/ha, compared with 44 kg/ha in scenario 1.

Given record high P fertiliser prices for 2022, scenarios 2 and 3 provide an opportunity in this paddock for reducing average MAP fertiliser rates by 58-66 kg MAP/ha compared with scenario 4, a saving of $87-99/ha.

Table 6. Results from four modelled scenarios where high grain prices are couple with a range of MAP prices and fertiliser strategies.

Scenario	Grain Price	MAP Fert Price ($/t)	Min MAP fert rate (kg/ha)	MAP fert rate range (kg/ha)	Ave MAP fert rate calculated (kg/ha)
1	Decile 9	750	0	0-200	44
2	Decile 9	1500	0	0-130	24
3	Decile 9	1500	20	20-130	32
4	Decile 9	750	Replacement from previous yield	50-200	90

Conclusions
High P fertiliser price is currently slightly offset by high grain prices but with uncertainty if these grain prices will continue into 2022 it is advised to revise P applications in 2022 due to significant impacts on optimal P rates required to maximise gross margins. Several data layers are available to assist with identifying areas where P rates can be safely cut back and those that will still return a profit with increased grain yields through adequate P applications.

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Resilient EP project

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Aim
The existing Eyre Peninsula soil moisture probes and other technologies will be used to assist farmers make efficient use of limited soil water. A Regional Innovators group of farmers and advisers will engage researchers and link with the region's farmers to develop techniques to integrate information generated from the probes as well as satellite imagery, climate and yield models, in a user-friendly format to help make more profitable decisions.

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Josh Hollitt, farm consultant
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Andy Bates, farm consultant
Jake Hull, farm manager
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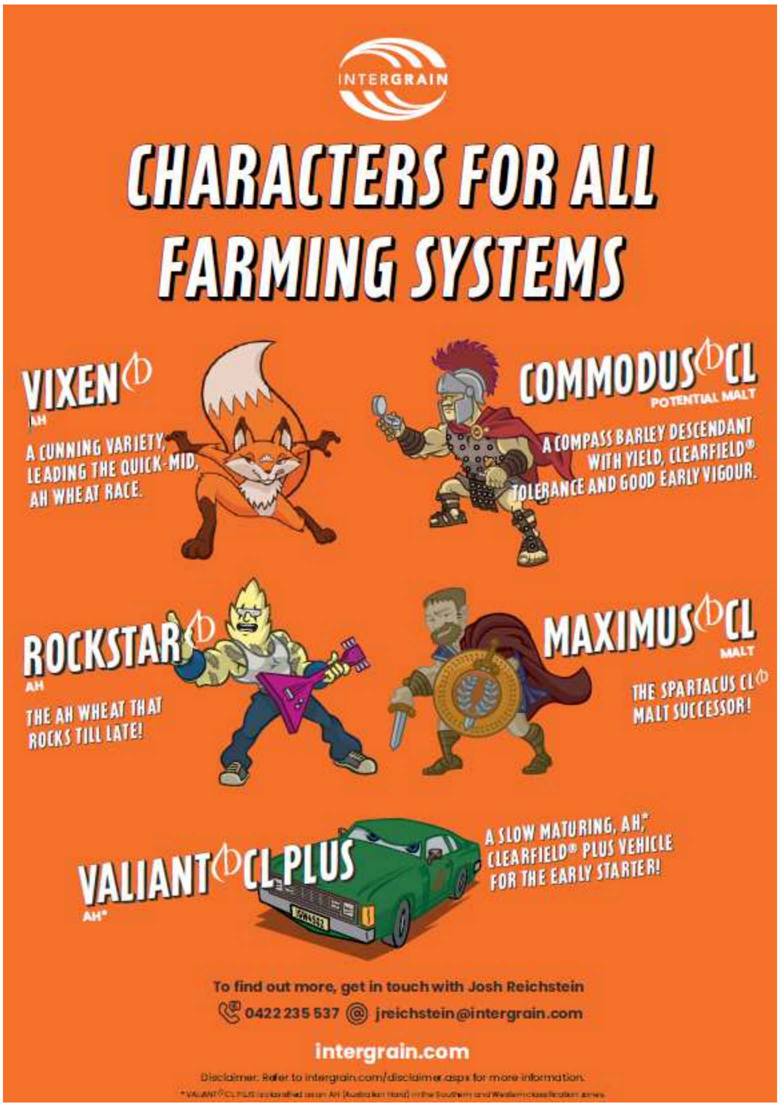

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