

National project aims to support grower decision-making



The GRDC has recently commenced a national research and extension project that seeks to understand and improve the risk-reward outcomes for Australian grain growers by supporting grower on-farm decision-making.



Hayden Thompson discusses RiskWiSe nitrogen management strategies at FarmLink's 2023 Open Day

The program titled 'RiskWiSe' (National Risk Management Initiative) includes a \$30 million investment by GRDC coupled with \$13 million from more than 40 researchers, grower, advisor and extension groups across Australia. The national program lead is CSIRO.

Six Action Research Groups (ARG) have been formed nationally and in NSW we have established a team led by Charles Sturt University and FarmLink Research that includes the following partners – Riverine Plains, Central West Farming Systems, AgGrow Agronomy, AMPS, IREC, Southern Growers, Holbrook Landcare Network, Grain Orana Alliance, Irrigated Farmers Network.

The aim of the project is to support grain growers in their production management decisions in terms of probability of upside returns (reward) offset against the associated downside risks, and therefore improve the quality of on-farm decision making.

The approach to the program will be through the mechanism of Participatory Action Research (PAR). Simplistically, this means including all stakeholders (growers, researchers, consultants, etc) in identifying impactful on-farm decisions where the probability of risk-reward is not well understood, determining the priority areas to be studied and define the most appropriate methodology for research that will generate new knowledge to inform more effective decision making in a risk-reward context.

Five themes have been identified that will be studied as part of the national program. These are:

- ▶ Nitrogen Decisions
- ▶ Sowing Decisions
- ▶ Enterprise Agronomic Decisions
- ▶ Enterprise Financial Decisions
- ▶ Managing Natural Resource Capital

The NSW ARG has already begun its program of work on the Nitrogen Theme with the establishment of 9 replicated trial sites across the state that will examine the performance of different nitrogen management strategies over a four-year period. These sites are located at:

- ▶ Premer
- ▶ Gurley
- ▶ Walgett
- ▶ Wongarbron
- ▶ Trangie
- ▶ Condobolin
- ▶ Griffith
- ▶ Temora
- ▶ Harden

Different treatments that are used in the replicated trials, represent different decision-making processes that can be studied over multiple years to determine the risk-reward trade off that they would have. They include using proven decision-making tools such as Yield Prophet® to identify the rate of nitrogen that should be applied each year of the cropping sequence. Across the 9 sites, there are core treatments as well as treatments that represent decision-making techniques used locally. The treatments used at the Temora and Harden sites managed by FarmLink are discussed below.

Using a proven decision-making process may give more confidence to take more risk when applying N fertiliser which could result in increased long-term profitability but there will also be less risk in underapplying N which results in the mining of soil nutrients and organic matter.

The nitrogen risk strategies investigated in the trials can be separated into the following areas:

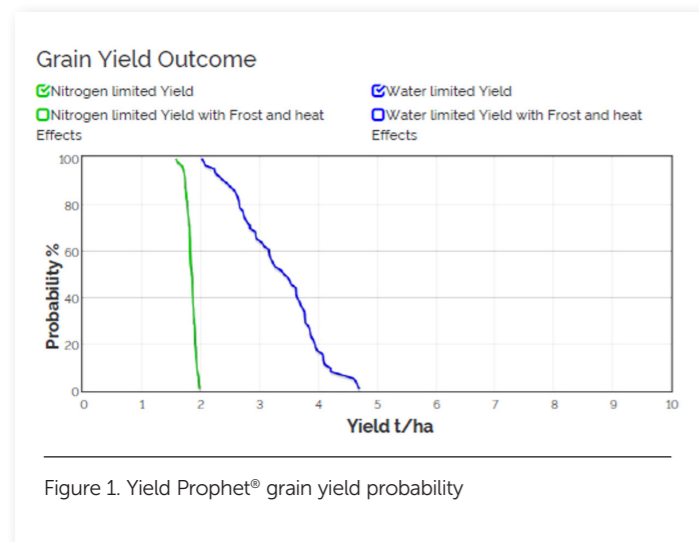
- ▶ Yield Prophet®
- ▶ N Bank Target
- ▶ Replacement
- ▶ Alternative Fertilisers



Yield Prophet®

Yield Prophet® is a decision support tool that can identify the probability of a given crop in a given location of reaching its water limited yield potential. To achieve this, location, rainfall, plant available water, and soil mineral N need to be inputted into the support tool. An example of the output from the Temora site is shown in Figure 1. The blue line represents the water limited yield potential of the crop based on the data inputted. Based on historical weather data, the probability of achieving this water limited yield is shown on the y axis. The green line represents the nitrogen limited yield which is based on the inputted soil test results. Because this has given an estimate of grain yield, the N demand can be calculated that would increase the nitrogen limited yield to the water limited yield line at any given point on the line.

The treatments used in the trial are three different points which have a different probability of achieving the given yield. These are 80% probability which is low risk, 50% probability for medium risk and 20% probability for high risk. One more treatment also chooses one of these probabilities based on the seasonal forecast from the Bureau of Meteorology. This means that instead of always using the same probability calculation each year, it will change depending on the seasonal forecast.



N Bank Target Strategy

N Banking is a much simpler method of calculating the N fertiliser rate. It is simply setting a target of soil mineral N, which is kept through every season regardless of seasonal conditions. The N bank target is a level of soil mineral N which is achievable for a particular soil type and annual average rainfall without achieving significant N losses through leaching and denitrification. Once a soil test is taken, the amount of fertiliser required will be the difference between the test results and the N bank target. This means that crop N demand and mineralisation through a growing season is not considered. This could be considered a high-risk strategy as a high amount of N may need to be applied if there has been high crop removal and losses in the previous year. However, a profitable level of soil mineral N will be kept in the soil and prevent the mining of soil organic matter.

Replacement

This may be a conservative and low risk method of applying nitrogen, but it still represents using a decision-making process rather than just applying a low rate of N every year. This is calculated by measuring the amount of nitrogen that would have been removed by grain from the previous crop. The N removal is then reapplied as fertiliser to the subsequent crop.

Alternative Fertilisers

Increasing soil mineral N could also be done by using alternative methods such as applying manure, enhanced efficiency fertilisers and brown manure crops. At Temora and Harden, a vetch brown manure crop is being grown every second year of a rotation to identify how much mineral N can be supplied to the subsequent crop through the fixation of organic N by the legume plant. This may be a cost-saving exercise when looking at long-term profitability as well as helping to maintain soil organic matter.



RiskWi\$e

– the National Risk Management Initiative

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RESEARCH PARTNERS



ACTION RESEARCH GROUP LEADS



PRINCIPAL PARTNER



NATIONAL PROJECT LEAD

