Nutrient Research Forum February 27, 2018

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Background

As part of the GRDC-funded 'Nutrient Scoping Study', a workshop was held in Perth in conjunction with the 2018 Research Updates. The workshop was set up as a panel discussion, facilitated by Wayne Pluske. Panel members were Craig Scanlan (DPIRD), Sean Mason (Agronomy Solutions), Craig Bignell (grower), Rob Grima (Planfarm), Peter Norris (Agronomy For Profit) and Gary Lang (grower). Approximately 50 people attended, including many consultants and industry representatives.

In this report, we summarize the discussions grouped into several topics, which do not necessarily follow the order of discussions at the forum.

Recommendations or consensus for future research are highlighted in each section.

Meeting notes were collected by two people – Phil Ward and Meagan Gillespie. Both sets of notes are appended to this report.

Meeting summary

Current fertiliser strategies

Fertiliser is generally the biggest variable cost in the farm budget (about 30%), but in overall farm business decisions, fertiliser does not get a level of attention proportional to its cost. Fertilisers are often considered a 'necessary evil' and fertiliser decisions are treated accordingly with limited enthusiasm and effort put into such costly decisions. Crop nutrition requirements are commonly based on previous years' inputs. Fertilisers are viewed as an item in profit and loss statements and if overall cropping margins are okay there is no impetus to alter fertiliser inputs. Any slight variations from year to year are based as much on the previous season's production (and tax liability) as on the coming season's anticipated production (which is usually a decile 6 or 7 season). Return on investment (ROI) in the single input cost of fertiliser is rarely measured on-farm; rather it is assumed to be 'okay' if overall farm business profitability is acceptable. The balance between fertilising for short-term profit and long-term (residual) productivity tends to reflect business cashflow and equity rather than being a calculated decision.

What is the ROI for fertiliser, and how does this compare with other farm expenses (for example, deep ripping).

Research required to increase nutrient use efficiency.

Ameliorated soils

In ameliorated soils (e.g. mouldboarded, deep ripped, spaded), soil nutrients are redistributed horizontally and/or vertically in the soil profile. This will have impacts on timing of availability of the nutrients and on soil sampling strategies.

How does deep soil disturbance change distribution of soil nutrients?

Does amelioration change the interaction between seasonal rainfall and crop growth and yield?

Variable rate technology

Blanket application rates are still the most common method of applying fertilisers, but there is interest in VRT. However, this interest has not yet developed into broad-scale adoption, because the logistical and/or financial benefits of going through the hassles of changing are not obvious at this stage. The scale of variation in available soil nutrients may not be compatible with current seeder widths, which is the practical limit to VRT using available technology. Furthermore, variation in PAWC occurs just as rapidly as variation in available nutrients, and this information is also likely to affect the outcome from using VRT. It may be better to focus first on zoning of paddocks for yield variability (essentially PAWC) than for nutrient requirements.

Need better definition of response curves in relation to PAWC.

Can VRT be applied at finer scales than the seeder width? Is there an advantage to doing this?

Nutrition for grain quality

Fertiliser decisions should be based around economic returns, rather than maximising production and currently in most situations this means optimising yield responses. Grain quality can suffer adversely as a consequence of this, which does not have a large, immediate impact on an individual grower, but may ultimately affect grain prices and all grain growers. The obvious grain quality characteristic is grain protein, for which growers are presently paid a small premium. Grain milling quality is also important, but it too is not reflected in grain prices. In the future, there is a possibility that other grain quality parameters, possibly relating to nutritional factors, might become important in the market. At this stage however, there are no immediate requirements for research into grain quality traits other than those currently measured.

Can smarter timing of N application increase grain protein for same rate and yield?

Soil sampling

Two schools of thought became clear at the Forum. On one hand, soil sampling was regarded as the best indicator of soil fertility and crop nutrition requirement. On the other hand, some participants felt that the information derived from soil sampling was not trustworthy, either due to the lack of a standard for collecting soil samples or because soil testing was a ‘free’ and therefore not valued service offered by fertiliser companies. The phrase “There are as many methods for collecting soil samples as there are operators” was used a few times.

We need a standard method for collecting soil samples.

There was general consensus that the top tier of farmers tend to sample their soils regularly, and value the information they receive. Many ‘average’ farmers undertake soil sampling, but maintain their sampling using incentives from industry, and may reduce their sampling if incentives were not available.

Laboratory analysis

The discussion of laboratory techniques centred around the use (or misuse) of the Colwell-P test. The DGT-P test was discussed as showing promise as a better predictor of crop P requirement. However Colwell-P, as the historical and incumbent test method of choice, will still be widely used, and on some soils it will give reasonable results.

> *P response curves are required for the DGT-P test for soils where Colwell-P gives inaccurate results.*

Plant tissue testing

Tissue testing was described as about 1/7th as popular as soil testing. Major drawbacks to the use of tissue testing were: (1) the best time to collect plant samples was also the time when spraying was required; and (2) the delay between collecting the samples and getting the result (several weeks in some cases) often meant that it was too late to take action. There was also a perception that tissue testing simply reflected the seasonal conditions, and did not necessarily give a good indication of crop nutrient requirement. However, tissue testing results could provide information that might be useful for the next season.

Potential new technology

Development of IR testing shows promise. Laboratory analysis is now possible, and could be deployed to give much cheaper and faster plant sample analysis, which could overcome some of the perceived limitations. The current technology does not appear to be as accurate as conventional laboratory analysis for determining nutrient concentrations, but the capability to analyse many more samples, much faster, may provide more meaningful and timely information. Future developments could also include drone-mounted sensors to give rapid assessment of whole farms, which would make the process cheaper and faster again.

> *Can IR give better and faster results for tissue testing, and does this lead to better fertiliser decisions?*