

# Taking a tactical approach to in-season nitrogen application

**H**OW much nitrogen should be applied in-season? That is the burning question many grain growers contemplate following good winter or spring rains which trigger a revision of the outlook for yields.

For example in Western Australia this year, after the late start to the season, rainfall in many parts of the state in June spurred growers into activating growing season nitrogen (N) application programs in a bid to capture water-limited yield potential.

Manager of agronomy, soils and farming systems – west, Rowan Maddern, advises that growers need to consider a number of factors in their fertiliser decision making in an effort to match a crop's N requirements.

"Knowing the status of existing nutrient levels and any change in yield potential is important in determining how much nitrogen should be applied," Rowan says. "It's a balancing act – growers don't want to miss out on capturing yield potential but they also don't want to be spending money on inputs if a return on that investment is not likely."

Rowan says growers should consult with their advisers about any review of their nutrient programs, and recommends plant tissue testing as a useful in-season tool to refine initial recommendations.

The GRDC also has available to growers a suite of GrowNotes publications for all crop types which offer information on in-season application of N. For example, the Western Wheat GrowNotes includes a 'best-bet nitrogen strategy' and a decision tree for in-season N applications according to the progress of the season and crop developmental stage.

## Key in-season N recommendations for wheat

- Match wheat N requirements as the season unfolds. Even in low rainfall areas, potential yields can vary between less than 0.5 tonnes per hectare and more than 4 tonnes. Implementing a best-bet strategy to account for this yield variation limits fertiliser costs in poor seasons and forgone yield in good seasons.

- A best-bet nitrogen strategy pivots on sowing the crop with enough nitrogen for a low or average yield. If the season continues to be dry there is enough nitrogen applied at sowing for the expected yield. If the season continues as poor there is enough nitrogen applied at sowing for the expected yield.
- During late tillering, if an average or better season is developing, apply more N at first node to match the new water-limited yield potential.
- From stem elongation to ear emergence, further assess the season. If it seems average or drier, apply no more N. If it is wetter than average, apply more N but still observe the requirements of moist soil and a reasonable prospect of follow-up rain.

## Barley recommendations

- The pattern of barley crop demand for N during the growing season should be considered. The highest demand is when the crop is growing most rapidly.
- Most responses to nitrogenous fertiliser (particularly in WA) are the result of an increased number of ears or grains. The response is largely caused by increased tillering, which is determined early in the life of a barley plant. The number of grains per ear is also determined early. Therefore, a good supply of N is needed early in crop growth.
- Early application is preferred in the production of malting barley because it is more likely to increase yield without raising grain protein levels. The other consideration is that in sandy soils in higher rainfall areas, the application should be split or delayed 3 to 4 weeks. This allows the crop to establish a reasonable root system and avoid large leaching losses.
- The best time of application in any one season can vary depending largely on the incidence of leaching rains in relation to time of application. Profitable responses can often be obtained up to 10 weeks after sowing. Late applications are more likely to result in increased grain protein.

## More decision tools on the way

Rowan says growers are asking how they can capitalise on good seasons in time to make more profitable nitrogen decisions, thereby making optimum nitrogen applications for protein and best economic response while maintaining or increasing yield.

To address this, the GRDC is investing in a new project, 'Tools for growers that can enable best practice in-season nitrogen management to optimise economic returns and grain protein'.

Running until early 2021, the project's outputs will include nutrition masterclasses in the Esperance, Kwinana East and Kwinana West port zones, providing growers with a summary of N cycling and availability within a cropping season and enhancing their understanding of the basic requirements to improve cost-effective fertiliser decisions and ultimately grower profitability.

Other outputs from this new investment include new resources for growers and consultants to aid in N decision making to optimise economic returns.

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GRDC GrowNotes at <https://grdc.com.au/grownotes>.



GRDC manager of agronomy, soils and farming systems – west, Rowan Maddern, says making nitrogen decisions involves consideration of a number of factors. (PHOTO: GRDC)

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