RiskWi$e Case Study

Nitrogen Management and Crop Rotation on Ashley Jacob's Farm

Crop Rotation and Nitrogen Management

Ashley runs a mixed rotation that includes wheat, barley, canola, and lupins, alongside chemical fallow and pasture phases using clover and medic. These rotations play a key role in his nitrogen strategy by naturally replenishing soil nitrogen through mineralisation, particularly in legume and fallow years. This system allows Ashley to manage soil fertility while reducing reliance on synthetic nitrogen inputs.

Nitrogen Application Strategy

Ashley applies nitrogen primarily upfront, especially for cereals like wheat and barley, putting down about 50-55 units of nitrogen from seeding up until before tillering, with the flexibility of another 20 units if the year is looking suitable.

On lupin stubble, a similar strategy for top-ups based on seasonal conditions. For chemical fallows, mineralisation can provide up to 25 units of nitrogen, helping to boost crop performance the following year.

Response to Seasonal Variability

Ashley's nitrogen decisions are heavily influenced by the previous crop and paddock history, with different nitrogen strategies based on whether the crop is following a legume, fallow, or wheat stubble.

He adjusts nitrogen rates according to rainfall forecasts and soil moisture, noting that his decisions are also shaped by the risk associated with uncertain rainfall in a low-to-medium rainfall zone (310-320 mm annually).

The decision to apply extra nitrogen, usually after the crop reaches the four-leaf to tillering stage, is also based on crop health, soil conditions, and long-range weather forecasts.

Impact of Nitrogen on Crop Yield

In previous trials, additional nitrogen showed a slight increase in yield but didn't always translate into significant profit margins. For instance, adding 50 litres of UAN (liquid nitrogen) increased yield slightly but the costs nearly matched the profit, making the decision marginal in dry years.

Ashley also noted how residual nitrogen from past crops, especially those with poor yields, can carry over and affect the nitrogen needs of subsequent crops.

Nitrogen Use Efficiency and Future Needs

Ashley works closely with an agronomist but ultimately makes his own decisions based on paddock history, crop type, and seasonal factors.

He prefers to apply most of his nitrogen upfront, especially in low-rainfall areas, believing that early application is crucial for getting the most out of the nitrogen.

He also considers fertiliser prices in his decision-making but stresses that seasonal conditions have the greatest impact on how much nitrogen he applies.

Future Considerations

Ashley sees value in developing a nitrogen decision-making tool that could factor in soil type, paddock history, crop health, rainfall, and previous nitrogen applications to help farmers determine the optimal nitrogen rates. He believes a simple, user-friendly tool would help farmers make more informed decisions about nitrogen applications without overcomplicating the process.

Conclusion

Ashley's nitrogen strategy is built around upfront application, adaptive management based on seasonal outlook, and a deep understanding of paddock history. His cautious approach in low-rainfall years, coupled with a focus on soil nitrogen dynamics through rotation and mineralisation, supports sustainable nutrient use.

Looking forward, Ashley sees the development of decision-support tools as a way to enhance nitrogen efficiency and help growers make smarter, more timely input decisions.

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