MANAGING NITROGEN IN TROPICAL FARMING SYSTEMS: A BUDGETING AND MITIGATION APPROACH

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Increasing nitrogen use efficiency (NUE) and minimising nitrogen losses in intensive farming systems presents major challenges for producers and policy makers. These challenges are particularly acute in tropical farming systems that are adjacent to sensitive marine and estuarine ecosystems such as the Great Barrier Reef (GBR) lagoon and Moreton Bay in southeast Queensland. Despite substantial investment over the last fifteen years into increasing the adoption of best management practices (BMPs), there is increasing evidence that the adoption of nutrient management practices has stalled. When practice adoption rates are combined with water quality monitoring data it's clear that relying on current industry BMPs alone will not achieve water quality targets and therefore address the risk posed by agriculture to sensitive ecosystems. However, the reality is that producers and their advisors are being asked to undertake complex nutrient management often in the absence of fit-for-purpose empirical evidence. This evidence base is particularly crucial when farming system changes and environmental outcomes are required. In addition, there has been little to no research into other tools that recognises the difficulties of managing nitrogen losses and would support agronomic efforts. This work presents a nitrogen (N) management approach that seeks to complete the nitrogen cycle for both producers and policy makers. It employs a co-innovation approach that aims to improve our understanding of nitrogen movement and management at farm scales; and that a mix of approaches will be needed to address this wicked problem. It discusses coupling an investigation in pineapple systems via a nitrogen budget with edge-of-field mitigation using woodchip bioreactors. The results demonstrate that even under conservative nitrogen regimes, losses of N can be substantial and that the first woodchip bioreactor wall constructed in Queensland achieved complete removal of nitrate (NO_3-) in shallow groundwater. This work has led to a rapid improvement in the understanding of BMP efficacy and how woodchip bioreactors are an effective and easily implementable method to mitigate losses from intensive farming systems.

Editor's note: *An extended manuscript has not been submitted for this presentation.*
