Improving organic amendment use in Australian vegetable production

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Abstract

Organic amendments (OAs) are used in many Australian agricultural production systems although the potential nutrient supply from these OAs is often not properly accounted for. Farmer tools (calculators) will support more efficient fertilizer use in the vegetable industry by modelling the release of nutrients from OAs with field validation in commercial vegetable cropping. Calculator optimised fertilizer programs are being compared to current commercial practice in terms of crop yield, quality and nitrous oxide emissions. The calculator will provide farmers with a tool to develop more efficient nutrient application programs ultimately providing both economic and environmental benefits.

Keywords: Organic Amendment, N_2O

1. Introduction

Commerical OA applications in high value horticultural crops and broad-acre crops (e.g. cotton) in Australia add large amounts of N (typically 200-300 kg/ha per application). Australian farmers often don't take into account the potential supply of plant available nutrients from OAs. High OA rates have been associated with low nutrient use efficiency (NUE) and therefore large nutrient losses, including environmentally damaging N_2O emission in Australian vegetable cropping (Porter et al, 2017).

This project is part of a larger Australian project also involving cotton, grains and fodder crops, seeking to improve the utilisation of the nutrients in OAs to improve both farmer profitability and environmetal outcomes.

2. Methods

Field trials are being conducted in two major vegetable production regions in Victoria, Australia with contrasting soil types ranging from sandy soils to heavy clays. Treatments being applied are shown in Table 1. Initially the reduced inorganic fertilizer rates for the treatments OA1+Red I and OA2+Red I have used mineralisation rates estimated from the literature (De Rosa et al 2016) to deliver the same amount of N as the standard inorganic program (I).

To improve estimates of nutrient mineralization from OAs under Australian vegetable cropping conditions, soil and OA amendment samples are being used in laboratory incubation studies. The results of these incubations will be incorporated into the final version of the calculator and will be field validated in commercial vegetable cropping. Optimized nutrient programs will be compared with current practices with the effects on crop yield, quality and N_2O emissions determined.

Table 1. Nutrient treatments used in the vegetable trials

Treatment	Description
Control	No fertilizer or OA
OA1	Chicken litter
OA2	Urban derived compost
I	Inorganic fertilizer
OA1+I	Chicken litter+Inorganic fertilizer
OA2+I	Urban derived compost+Inorganic fertilizer
OA1+Red* I	Chicken litter+Red Inorganic fertilizer
OA2+Red I	Urban derived compost+Red Inorganic fertilizer
Red I	Red Inorganic fertilizer

*Red= reduced rate

Acknowledgements

This work has been funded by the Department of Agriculture, Australia through the Smart Farming progam and La Trobe University.

References

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