

Sustainable Nitrogen Cycling: Using Human Biosolids in Cropping Systems to Manage soil N

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Abstract

Current and future increases in food production must go in parallel with better nutritional quality while minimising the problems associated with heavy usage nitrogen (N) fertilizers. In this regard, we use human biosolids to sustainably manage soil N while overcoming soil constraints that limit potential yield. Biosolids applied as surface and subsurface ameliorant in nine treatment combinations, and examined soil chemical and physical properties after 12 months of the treatments, along with N use efficiency and nutrient remobilisation rates temporally in cropping cycle. Above ground biomass at tillering stage was significantly response to biosolids applications.

Keywords: sub-soil amelioration, soil physiochemical properties, grain yield

1. Background and aim of the project

Since the green revolution introduced the widespread use of synthetic fertilizer to increase crop production, synthetic N fertilizer usage has increased by >90% to 2017. Increased use of N fertilizer to feed a rapidly growing population has pushed the N cycle beyond sustainability.

Recent, attention has focused on utilizing human biosolids from the sewerage industry as a nutrient source in agriculture. Even though the use of biosolids is becoming more popular in some destinations, only 31% of the total production of biosolids are used in agriculture in Victoria, Australia (Surapaneni *et al.*, 2014).

It has been reported that subsoil amelioration with N-rich organic substances improve physiochemical properties, biological activity in the deeper soil layers, that can lead to higher crop productivity (Gill *et al.*, 2012).

Our objectives was to examine the effect of biosolids as surface and sub-soil ameliorant on crop yield and soil physiochemical properties.

2. Methodology

In this investigation, trials using biosolids is conducted in the high rainfall zone (HRZ) in Victoria. Basic soil physiochemical and nutrient properties were measured at different depth increments (0-10cm, 10-30cm, 30-50cm)

before biosolids were applied, and measurements will be continued at 6 and 12 months after treatments.

3. Early Results

Above ground observations to date show a crop phenology development similar to those achieved with other organic substances (Gill *et.al.*, 2019) and suggests the potential of biosolids as a soil ameliorant.

4. Acknowledgements

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5. References

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