National Agricultural Manure Management Program

Composting As a Means of Minimising Greenhouse Gas Emissions from the Manure Supply Chain

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Background

The project assesses the potential for reducing greenhouse gas emissions by composting rather than stockpiling animal manures, and by using composted rather than raw manures in horticultural production in combination with reduced use of mineral fertiliser.

Objectives

The objectives of this project are to:

- Determine the methane, nitrous oxide and carbon dioxide emissions during the stockpiling and composting of feedlot, dairy, pig and chicken manure;
- Compare emissions when employing passively (windrow and static pile) and actively aerated (aerated pile) composting technologies;
- Determine greenhouse gas emissions associated with the use of composted and raw manures in vegetable production systems with full and reduced mineral fertiliser application rates;
- Monitor the development of available soil nitrogen levels following the use of compost and manure; and
- Determine crop yield responses (green beans, broccoli, lettuce).

Key activities

Greenhouse gas emissions are determined during the stockpiling and composting of animal manures, and also following the use of raw and composted manures in irrigated intensive horticulture. This approach provides emissions data for the full supply chains of different manure management strategies.

Gas emissions are measured with a combination of automated and manually sampled chambers. Supplementary data on nitrogen and carbon transformation through the composting cycle and after field application of the organic amendments are also being collected.

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Agronomic data collected from field application will be used to determine the cost/benefit of using manure/compost, and the potential for reducing mineral fertiliser application rates.

Outcomes

The project determines greenhouse gas emissions of the entire manure supply chain, covering manure handling systems, and also the agricultural use of manure products. This research will provide emission factors for stockpiling and composting (windrowing, aerated and non-aerated static piles) of manures, and offer options for reducing GHG emissions from manure management.

Horticultural field trials will provide information as to whether manure/compost use increases or decreases emissions, and show the potential for reducing fertiliser inputs, and also greenhouse gas emissions. Farmers will see ways of increasing nitrogen use efficiency and the potential for reducing fertiliser inputs.

Furthermore, research results will provide baseline data for developing Emissions Reduction Fund (ERF) methodologies, providing producers with practical ways to participate in the ERF.

Implications

Project results will deliver key data that for future inclusion of 'composting' as a manure management system into the Australian Greenhouse Accounting System. Furthermore, results will provide greenhouse gas emission data for the entire manure supply chain, and therefore also for the development of an ERF methodology.

Farmers will learn what nutrient (N, P, K, micronutrients) contributions can be expected from raw and composted manures, and to what degree the supplied nutrients can substitute mineral fertiliser inputs. They will also learn if the combined use of organic and mineral fertilisers increases crop yield (synergy effect) and whether nitrous oxide losses increase or decrease, depending on whether nitrogen fertiliser application rates are reduced or not.