REAL's Research Hub

Project #3 – Project Brief

1 Project Title

Plant Response Test Failures: Investigation of contaminants and phytotoxins in 'End of Waste' composting feedstocks and finished composts

2 Background

The Plant Response Test (PRT) is a key element in 'End of Waste' compost evaluation as a bioassay to screen for natural and anthropogenic toxins in finished composts. The PRT simultaneously tests for 'weed seeds and propagules'. Overall, the test is doing a good job and there are relatively few failures.

Whilst failure rate is low, any failure results in significant financial and logistical issues (e.g., occupancy of space whilst waiting for retest results). Failure requires the producer to take corrective action. Whilst most causes of test failure are clearly attributable to other measured properties (e.g., salinity, ammonia), some failures on top growth (and to a lesser extent germination) do not correspond to failures in other measured properties and thereby create a challenge when the producer is seeking to implement corrective action. The 'End of Waste' test procedures are designed for compost, which is for horticultural use, whereas the bulk of certified compost is used agriculturally as a soil conditioner and the PRT procedures do not seem entirely relevant to this end use.

This proposal seeks to investigate natural and anthropogenic organic compounds/phytotoxins present in the feedstocks and compost which may result in test failures which are not explained by the normal suite of measured parameters. Further, with a better understanding of the types/concentrations of relevant organic contaminants/phytotoxins in composting feedstocks and finished composts, the project will look to define a suite of chemical tests (with a significantly faster turnround than the PRT) to enable release to restricted markets following failures.

3 Project Definition

The project will seek to investigate the natural and anthropogenic contaminants in composting feedstocks and composts that may contribute to PRT failure by:

I. Sampling an array of feedstocks and composts to determine the presence of a range of key organic contaminants and phytotoxins present (e.g., phenols and volatile fatty acids) not covered in routine testing.
II. Identifying whether the organic contaminants identified in I. above are more prevalent at different times of the year or under different climatic conditions (e.g., cool moist winters) and composting regimes (e.g., vessel or pad composting).
III. Defining a suite of chemical tests and threshold values to enable restricted market release following PRT germination/top growth failure.

3.1 Project Objectives

Objective 1 will identify any patterns in the nature of feedstocks, composting process (in-vessel or open windrow pad composting) or time of year where failures occur.

Objective 2 will determine the types and concentrations of phytotoxins present in the feedstocks and composts.

Objective 3 will define a suite of chemical tests and threshold values to enable restricted market release following PRT germination/top growth failure.

3.2 Project Deliverables

- Provide a fuller understanding of the organic contaminants/phytotoxins that may help interpret PRT failures.
- Define a suite of chemical tests for restricted market release for consideration.
- The data on organic contaminants/phytotoxins in feedstocks and composts will have wider benefit to the sector beyond addressing this project.