Seed Germination and Vigor

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Why Analyze Seed Germination?

- Purpose
  - Screening mechanism for presence of phytotoxins in compost.
    - Pesticide residues (ex: Clopyralid)
    - Heavy metals
    - Excessive NH_4-N, salts, organic acids
  - Direct measure of product quality

First Method for Analysis

- **Seedling Emergence and Relative Growth Method***
  - Seedling emergence
    - Cucumber seeds planted in 1:1 compost/vermiculite mix (radish, cress, Chinese cabbage seed common)
    - Distilled water for seedbed moisture
    - 2 controls: soilless potting media, pure vermiculite
    - % Emergence= $\frac{\text{\# seeds emerged}}{\text{\# seeds planted}}$

>90 = Very Mature

90-80 = Mature

< 85 = Immature

*Test Methods for the Examination of Composting and Compost, 4.1 05.05A

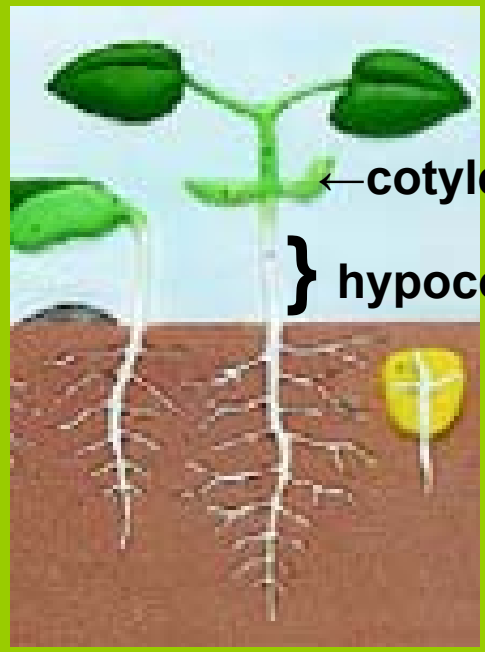
First Method for Analysis

- **Seedling Emergence and Relative Growth Method**
  - Relative Vigor
    - Plant cucumber seeds in 1:1 vermiculite/compost mix
    - Plant 2 controls: vermiculite, soilless media
      - Measure after 12-14 days:
        - Seedling turgor
        - Hypocotyl length
        - Relative shape of cotyledons
        - Fresh weight of shoots

% Vigor = # seedlings with well developed structures in compost

 # seedlings with well developed structures in vermiculite

Vigor



Germinating Plant Parts

Not vigorous Vigorous

Seeding Vigor, % : >95 = very mature compost

85-95 = mature

< 85 = immature

Second Method for Analysis

- **In-Vitro Germination and Root Elongation Method**
  - Germination Rate
    - Compare germination rate (days) in compost extract solution to germination rate in deionized water.

% Germ. Rate= Avg. germ. time (d) for treated seeds

Avg. germ. Time (d) for control seeds

Second Method for Analysis

- **In-Vitro Germination and Root Elongation Method**
  - Elongation Method
    - Radicle (an immature root) health compared:
      - Compost extractant solution

        vs.
      - Deionized water

Effect of Compost on Germination and Vigor

- Maturity =
  - ✓Compost's suitability for plant growth
  - ✓Depends on what the compost will be used for
  - ✓Be sure to cure compost!!
  - ✓Mature compost = happy seedlings

Management Musts!

- Look at compost analysis to decipher why germination test results were low (EC,pH…)
  - If recognizable then manage that variable

- Send in second sample to assure poor results are not lab mistake
  - Have a dialog with lab about their observations and suggestion for next series of tests to run.


QUESTIONS??