

Bioassay for Auxinic Herbicides in Soil, Manure or Compost

Introduction

This methodology described below is designed to test samples of soil, manure or compost for presence of auxinic herbicides that may be detrimental to sensitive crops planted in the sampled soil or planted where the sampled manure or compost is used as a soil amendment.

While this methodology will test for the presence of certain types of herbicides in soil, manure or compost, gardeners should also be aware of the potential for other potentially detrimental substances to be present in these media. The following is guidance provided by the University of Minnesota Cooperative Extension

<http://www.extension.umn.edu/distribution/horticulture/M1192.html> when using fresh manure as a soil amendment.

“Fresh manure is high in soluble forms of N, which can lead to salt build-up and leaching losses if over applied. Fresh manure may contain high amounts of viable weed seeds, which can lead to weed problems. In addition, various pathogens such as *E. coli* may be present in fresh manure and can cause illness to individuals eating fresh produce unless proper precautions are taken. Apply and incorporate raw manure in fields where crops are intended for human consumption at least three months before the crop will be harvested. Allow four months between application and harvest of root and leaf crops that come in contact with the soil. Do not surface apply raw manure under orchard trees where fallen fruit will be harvested.”

The bioassay presented below is designed to test only for auxinic herbicide residues and not other substances.

Materials

4 or 5 inch flowerpots

Plastic saucers

Non-contaminated soil (loam texture) or potting mix

Plastic bags

Labels for pots

Disposable gloves

Crop seed - Garden pea seeds or beans (variety not specified) or the intended garden plants

Photographs of plants showing herbicide damage

Methods

- Insect larvae found in fresh manure, compost, or soil may feed on planted crop seeds or seedlings so try to remove larvae from samples to be tested.
- Manure or compost samples should be placed in a clean bucket and mixed with an equal volume of loam soil or potting mix that does not contain herbicides.

- Use clean plastic bags to mix each manure or compost sample with soil or potting mix to avoid cross-contamination.
- If testing garden soil, collect soil samples from several representative spots throughout the garden and then combine and thoroughly mix the samples.
- Fill 4 pots with the soil to be tested or the manure- or compost potting medium mixture, tapping the bottom of the pots several times on solid surface (counter top) to settle mix.
- Label pots.
- Each pot should be placed in a separate tray or on a saucer to eliminate cross contamination when pots are watered.
- Additional pots containing only soil or potting mix not contaminated with herbicide with no manure or compost should be prepared to serve as a non-contaminated control.
- Position pots in random order on the bench.
- Space pots far enough apart to avoid splashing media from one pot to the next during watering.
- Once pots are prepared and in place, they should be watered and left to stand for 24 hours before test crop is planted.
- Plant 4 seeds in each pot by pushing seeds into the mix so they are just under the surface.
- Water each pot carefully to avoid splashing and washing pot contents onto bench.
- Keep pot contents uniformly moist, but not excessively wet.
- Minimize water leaching into tray or saucer. If excess water drains into tray or saucer, allow it to be re-absorbed back into the pot.
- If possible, maintain consistent growing conditions with 12 hours light and supplement with fluorescent grow lights as needed.
- Temperature in the area where plants are growing should not drop below 50 F at night.

Plant Injury Assessments

- Compare plants grown in pots that contain soil or the manure or compost potting medium mixture suspected of containing herbicide with plants grown in potting mix or soil that is not contaminated with herbicides.
- Observe the planted crop for symptoms of herbicidal activity, such as poor stand (effect on seed germination), chlorosis (yellowing), necrosis (dead leaves or shoots), or cupped or curled leaves. If herbicidal symptoms do not occur, the test crop can be grown. If there is apparent herbicidal activity, do not plant the intended crop. If there is evidence of an auxinic herbicide injury than one option is to plant a grass crop.
- Plants should be assessed at emergence and then at least at weekly intervals until they have 3 true leaves or longer.

Images of Injury Caused by Auxinic Herbicides

