


Seed Germination Test to Determine Compost Maturity

 **5 days to 2 weeks**
(depending on seedlings used)

 **Compost use**

 **Compost process**

 **All ages**

Materials

- 100 radish or cress seeds*
- Compost sample(s)
- A plate or seedling tray in which to germinate seeds
- Spritzer bottle with distilled water

*Radishes and cress seeds are recommended as they germinate quickly. Lettuce and other plants with thin seed coats will also work. You can also test seeds you plan to actually plant.

Background

Immature or unfinished compost when mixed into soil can harm plant growth. Compost that is still going through decomposition requires nitrogen for the process, especially if the compost contains woody material that is still breaking down. The decomposition process can rob plants of the nitrogen they need to germinate and thrive.

Composting microbes use nutrients to decompose materials, thus preventing the availability of these nutrients to plants. As a result, immature compost may prevent seeds from germinating and stunt or kill seedlings that do germinate. The bottom leaves of seedlings may turn yellow and die.

This seed germination bioassay is one broadly accepted strategy to test for compost maturity. It can also indicate the presence of phytotoxic compounds such as concentrated salts.

If the compost is known to be immature, it can be used as a mulch on top of the soil. Another alternative is to mix the compost into soil in the fall for land that won't be planted until the spring.

Objective

To determine if your compost is mature and ready to use as a growing medium or to incorporate into soils by testing seed germination



Instructions

1. Place a representative sample of screened and moist compost at least 1-inch deep on a plate or tray.
2. Count out 100 seeds and plant them in the compost about 1/2-inch deep** by either:
 - Gently pressing each seed down into the compost, or
 - Making holes with your finger, and simply dropping them in.
3. Cover the seeds gently with the moist compost.
4. Place the plate or tray where it can get sunlight or under a lamp. Radish seeds do not need light to germinate but light is needed for the seedlings to grow.
5. Keep the compost moist by watering with distilled water in the spritzer bottle.
6. After 5 to 10 days, count to see how many seeds have sprouted; this is the germination rate.
7. Compare the germination rate to the germination information on the seed packet or reported online.
 - Generally, an 80% germination level (min. 80 seeds sprout and grow) indicates the compost is likely sufficiently mature and ready to use.
 - If the germination level is below the expected, the compost may need to cure longer. It could also have a high level of natural salts or have an extreme pH level (too acidic or too alkaline). You may need to have it further tested to troubleshoot the issue.



**If you are using another seed type, follow its planting guidelines. Generally plant seeds twice as deep as they are wide.

Alternative Options

- For a smaller scale test, you can use fewer seeds (such as 50 radish seeds and then double the number sprouting in order to calculate the seed germination rate).
- You can also set up a control group to germinate the seeds (such as in a damp paper towel or in a sterile potting mix). If the control group is germinating at the expected seed germination rate and the compost is not, then the compost may be immature and need further curing. You can calculate the relative seed germination (RSG) by dividing the seed germination of the sample group by the control group and multiplying by 100.
- In addition to counting the seeds that have germinated, you can also identify differences in the length of the root shoot or radicle 3 to 4 days after germination to see if plant growth is impeded by the compost. (The radicle grows and anchors the seedling before the first leaves emerge. It develops into the primary root and later becomes recognizable as the radish itself.) This option requires a control group. The relative radicle growth (RRG) is the average length of the radicle in the sample group divided by the average length of the radicle in the control group multiplied by 100.
- If you measure RSG and RRG, you can calculate the germination index (GI), which was first used to evaluate the toxicity of compost in 1981. The GI is RSG multiplied by RRG and then multiplied by 100.

Further Resources

[Testing for Finished Compost](#), Master Composters of Tompkins County, Cooperative Extension Tompkins County, New York.

Yuan Luo, et al., [Seed germination test for toxicity evaluation of compost: Its roles, problems and prospects](#), *Waste Management*, Volume 71, January 2018, pages 109-114.

US Composting Council, STA Compost-Certified Laboratories
<https://www.compostingcouncil.org/page/CertifiedLabs>