

On-Farm Composting

BC Ministry of Agriculture

What Is Composting and What Opportunities Can It Offer My Farm?

Composting is the decomposition of organic materials by microorganisms under controlled, aerobic conditions to a relatively stable humus-like product suitable for growing plants, which poses no hazard to human health or the environment.

Composting can be done in many ways using a variety of systems, materials, equipment, and scales of operation.

While some farmers allow manure and/or plant material to pile up and decompose, this is not the same as composting.

Composting is a well-managed process to obtain specific positive end results with a minimum of negative environmental impacts. If done properly, finished compost is a high-quality soil amendment with a variety of beneficial end uses and can even be sold to generate income for the farm.

Composting has the potential to manage most of the organic material in the farm waste stream including crop waste, animal manure, and animal mortalities, and can be easily incorporated into any farm waste management plan.

What are the key benefits and challenges associated with composting?

Here are four clear reasons why farmers should incorporate composting into their farm operation:

Legal Definitions of Compost and Composting

According to BC's *Code of Practice for Agricultural Environmental Management* (AEM Code), an "agricultural composting process is a process whereby agricultural by-products, wood residue, mortalities or processing waste, or a combination of any of them are mixed or layered and managed to decompose aerobically with either periodic turning or forced aeration."

The *Agricultural Land Reserve Regulation and the Organic Matter Recycling Regulation* define compost as a product that is:

1. A stabilized earthy matter having the properties and structure of humus,
2. Beneficial to plant growth when used as a soil amendment,
3. Produced by composting, and
4. Derived only from organic matter.

1. Composting Reduces Farm Waste

Every farm accumulates organic waste, which is rich in nutrients. Composting will drastically reduce what needs to be hauled off site. The finished volume of the compost is frequently 40-60% of the original compost feedstock volume. This translates into lower hauling and spreading costs for the producer.

Composting also concentrates many of the nutrients in the compost material compared to the nutrient levels in the original materials. Well-managed compost has minimal odour and leachate potential, thereby reducing potential environmental hazards.

2. Composting Is Good for Soil

Composting takes organic waste from the farm and turns it into soil amendments and fertilizers, which can be put back into the farm by spreading onto pastureland and crops. Some nitrogen will be lost during composting and some will convert to more stable organic forms that are released more slowly to crops.

It has been estimated that less than 15% of the nitrogen in compost applied to soil will be released in the first year, meaning that the compost provides a long-term source of nutrients.

Composting can also help restore soil structure by adding organic matter, which in turn supports the rooting environment and prevents soil erosion. You can view more on this [Factsheet](#).

3. Composting Kills Pests and Pathogens

If high temperatures are reached and maintained during composting, it can efficiently kill pathogens that otherwise pose a health hazard to humans, animals, and plants. The high temperatures can also destroy weed seeds and the eggs of worms and insects. This reduces the need for pesticides and other pest management strategies.

Compost also contains beneficial microorganisms that help restore soil nutrients and stimulate plant growth.

Nitrogen is released as ammonia and nitrous oxide from the compost pile into the atmosphere. Some release of nitrogen is unavoidable during the composting process. However, a well-managed operation can substantially reduce nitrogen losses and keep the nitrogen in the finished compost product.

Attention should be paid to the optimal C:N ratio in compost feedstock and ensuring adequate oxygen supply.

4. Good Compost Can Be Sold and Contribute to the Bottom Line

In some instances, material from other farms or food waste can be composted with on-farm materials. A high-quality end product can be sold as an amendment to other farms; therefore, it can cover the costs of the compost process and contribute to the bottom line of the farm operation.

Benefits and Challenges of Composting

Benefits

- Reduces and/or eliminates pathogens
- Reduces volume of waste and moisture content
- Reduces viable weed seeds
- Reduces insect larvae (fly problems)
- Reduces odours
- Stabilizes organic components and nutrients
- Produces a soil amendment and/or fertilizer

Challenges

- Pathogen control requires high temperatures
- Often requires additional bulking material
- Processing time may take several months
- Requires good aeration to ensure a good end product
- Land is required for composting and storage areas
- May require initial financial investment
- Requires regular maintenance

How does the composting process work?

A basic understanding of the composting process is important for producing a high-quality product, and for preventing operational and environmental problems such as odour and leachate⁶.

During the composting process, heat, water, carbon dioxide (CO₂) and, to a far lesser extent ammonia (NH₃) and nitrous gas (N₂O) are released into the air as the microorganisms break down the raw organic material.

To optimize this process, there are 5 key requirements, as follows:

1. **Feedstock Mix:** The composting process requires carbon (C), nitrogen (N), oxygen and water.
2. **C:N Ratio:** The feedstock material must be well-mixed and have an optimum ratio of carbon and nitrogen.
3. **Oxygen:** The composting process must be aerobic (have access to oxygen). This minimizes the release of gases (other than CO₂) and is required for the most time-efficient process and to produce high quality material.
4. **Particle Size:** The particle size of the input materials must allow for a good mix and maintain good airflow through the pile or windrow (too small results in not enough air pockets, too large takes too long to decompose). This can be achieved by adding bulking agents.
5. **Water:** Water is required to maintain the life functions of the microorganisms in the compost; however, excess moisture will reduce the airflow and the compost will cease to be aerobic.

If any of these elements are lacking, or if they are not provided in the proper amount and proportion, the microorganisms will not flourish. This will result in low temperatures and the materials will not be composted.