

**Vermeer**



*Understanding the Growing Compost Market*



*A PRACTICAL GUIDE TO*

# COMPOSTING





## COMPOSTING PROCESS

The compost materials can be placed directly on a compost pad (lime-stabilized soil or paved area), but you should review regulations in your area to make sure the composting pad meets local and state requirements. The size of the land requirement for a windrow composting facility depends on the volume of material to be processed.

Depending on the type and size of materials to be composted, it may be necessary to process the raw material using a tub or horizontal grinder. This process will standardize the particle size and help the decomposition process.

The windrows should be aerated periodically to inject fresh air into the pile, removing the waste gas. Fresh air contains oxygen that feeds the beneficial composting bacteria and thus speeds the composting process.

Following the composting period, the windrows are broken down or moved and reconstructed into curing piles for additional aging and drying. This curing process allows partly decomposed compost particles to finish the composting process at a low temperature. This should take approximately 45 days and allows compost to stabilize so odor is no longer present, and the material can be stored without further decomposition.

After curing, the compost is processed with a trommel screen, which separates the larger pieces and fines from the finished product to achieve the desired final compost product.



## COMPOSTING METHODS



**Passive pile** – This process involves building a static pile of organic material which is packed and will not receive aeration. Passive piles generally have large areas that are anaerobic.



**Passive windrow** – Organic materials are mixed with raw materials (animal waste or sewage) and formed into long windrows. Perforated pipes are placed into the windrow and allow air to access the windrow through natural convection.



**Windrow composting** – This is a common composting method. Organic material is placed in long windrows and the material is turned periodically to accelerate the composting process and provide uniform compost. An open space is left between each windrow to allow room for turning equipment.



**Aerated static windrow** – This process is similar to the passive windrow concept except that the pipes inserted into the windrow have forced air that is either positive or negative aeration.



**Extended (continuous) windrow stacking** – Sites whose goal is to maximize space rely on this process. The process uses one continuous windrow covering the whole processing area, with the absence of an open space between the windrows. This process will allow for three to four times more material to be placed in the same space as conventional windrow composting, because there is no need to leave open space between the windrows.



**Invessel composting** – Organic materials are stored in tunnels or movable containers. This method seals off the outside world to prevent odor discharge.



## *WINDROW COMPOSTING*

Windrow and extended (continuous) windrow stacking are the most commonly used composting methods. Whether you utilize a windrow or stacking method depends on the space available and compost turning equipment you plan to use.

### ***WINDROW COMPOSTING***

The organic material is formed into long piles that are typically 5 to 10 feet (1.5 m – 3 m) high, 10 to 20 feet (3 m – 6 m) wide, and up to 300 feet (91.4 m) or more in length. This process requires that you leave an open space between the windrows, which provides room for the composting turning equipment to operate. Elevating-face or drum-style compost turners are typically used in windrow composting.

### ***EXTENDED (CONTINUOUS) WINDROW STACK COMPOSTING***

This composting method does not require an open space between the windrows and allows for more compost to be processed in less space. The continuous pile typically measures 5 to 9 feet (1.5 m – 2.7 m) tall and can cover the entire width and length of the area available. Elevating-face compost turners with an optional side conveyor place the compost into a desired location and are ideal for stacking applications.



## COMPOST EQUIPMENT

### GRINDERS

Grinders are a regular sight on many composting sites. Typically bulky materials need to be processed using a tub or horizontal grinder to achieve a uniform particle size. The uniform particle size helps with the decomposition process. Grinders on the market range from 85 hp to 1600 hp (62.5 kW to 1176.8 kW). Two things to be considered when selecting a size: the volume and size of material to be processed, and the need for mobility. There are two common types of grinders — tub and horizontal.

**Tub grinders** – Tub grinders generally perform better with heavy, large-diameter material such as stumps and root balls. Both loader and nonloader options are available. Among the primary advantages of having a grapple loader on the tub grinder is better visibility of the tub. The loader cab provides better visibility of the tub cavity, so operators can load material more efficiently. Self-contained loaders also eliminate the need for extra pieces of equipment, including a loading unit and the trailer needed to transport it.

**Horizontal grinders** – If processing longer raw material is the consistent application, a horizontal grinder may be the best choice. Horizontal models have a long feed table and conveyor that guide material into the grinder, avoiding the sometimes tedious task of material placement and manipulation. Horizontal grinders are also available with a track undercarriage that provides enhanced mobility.

### COMPOST TURNERS

Compost turners are vital to efficiently producing large volumes of compost. These units introduce oxygen into the compost pile helping to speed the decomposition process. There are two commonly used compost turners — drum and elevating-face. These units are designed to process up to 4000 cubic yards of compost per hour depending on the type and size of the turner.

**Drum turner** – These PTO-driven or self-propelled units straddle the windrow and feature a horizontal steel drum with paddles that turn rapidly to mix fresh air into the compost windrow. These units are efficient in turning and mixing the organic material to introduce air into the pile. This means that the material will finish quicker and there will be fewer overs when it is screened.

Drum turners vary from pull-behind to self-propelled. However, they cannot be used in extended (continuous) stack windrow applications.

**Elevating-face turner** – The elevating-face turner is essentially a wide sloping conveyor with teeth that lift the compost up and over the top, completely inverting the windrow. The teeth do not reduce particle size, thus reducing compaction and introducing and trapping oxygen in the material to help speed the decomposition process.

Elevating-face turners are ideal for windrow or extended (continuous) stack windrow applications. For extended stack windrows, with optional conveyor on the back of the turner places the compost in the desired location on the composting pad. These units can vary from pull-behind to self-propelled.



# COMPOSTING

Composting is a natural process of decomposing organic materials by using micro-organisms under controlled conditions. During the composting process, micro-organisms consume oxygen while feeding on organic matter. Active composting generates considerable heat, large quantities of carbon dioxide, and water is released into the air. This loss of carbon dioxide and water can amount to half of the weight of the initial materials. Composting thus reduces both the volume and mass of the raw materials, while transforming them into a valuable end-product.

## **ANAEROBIC COMPOSTING**

Almost any organic material can be processed in this manner. This includes biodegradable materials such as waste paper, grass clippings, leftover food, sewage and animal waste. This composting process enables organic matter to be broken down by bacteria in the absence of air. Anaerobic composting may be accomplished in large, well-packed stacks or other composting systems (silos, bags, digesters, etc.) where little oxygen can penetrate. While anaerobic composting may be less labor-intensive because you don't need to turn the pile, it creates a strong odor, and takes longer to finish as the organisms do not have as high a metabolism.

## **AEROBIC COMPOSTING**

Aerobic composting is the process by which organic waste is converted into compost in the presence of air. During aerobic composting, the water content in the biodegradable material is removed. Aerobic composting reduces the waste into nearly one-half of its original volume and the process usually takes from two months to one year. The organic material is arranged to provide some insulation and temperatures during decomposition will rise to over 135 degrees Fahrenheit. If the temperature exceeds 170 degrees Fahrenheit, however, the bacterial activity is decreased and stabilization slows. This process requires that the material be frequently turned in order to introduce oxygen to the material.



# THE COMPOSTING SEGMENT OF THE RECYCLING INDUSTRY CONTINUES TO GROW

Recycling has grown substantially in the United States with more than 4000 registered recycling locations today. The compost segment of recycling has grown into a multimillion-dollar market and continues to grow globally as communities divert green waste from landfills and explore new methods to utilize animal waste.

## THE FOLLOWING DRIVERS ARE CONTRIBUTING TO THE GROWTH:

### Regulatory Requirements

- State and local requirements to divert green waste from landfills
- Federal water and environmental protection standards
- Requirements to use compost products to control erosion

### Economic Incentives

- Increasing landfill tipping fees
- Cost of alternative use and disposal
- Incentives to expand recycling

### Business Growth

- Demand for organic fertilizers, soil conditioners and compost products



## MARKETS:

*Compost products have many everyday uses and applications, such as:*

- Top-dressing for yards and golf courses
- Compost socks consist of mesh tubes filled with compost that will slow and filter water on a construction site capturing soil and reducing erosion
- Compost can control erosion on disturbed areas such as construction sites, state DOT development (and planting) projects and exposed stream banks
- Organic fertilizer or soil conditioners