

Composting Basics for Ag Operations

- **Composting** is an aerobic method to speed up decomposing organic wastes by monitoring properties to encourage biological processes
- Rules and Regulations
- Methods of composting on the farm
 - Vermicomposting
 - Aerobic Static pile / windrow
 - In-vessel
 - Windrow / pile
- Steps to Successful Composting – Windrows/ Piles
 - Art and Science of Composting – resource
 - Optimal conditions – see chart
 - Create compost pile
 - Site
 - Size of pile
 - Organic materials to use
 - Surface area importance
 - Compost pile decomposes
 - Monitoring pile aeration
 - Maintaining pile moisture
 - Watching pile temperature to turn pile
 - Cure Compost
 - Let the pile rest
 - Tests to determine if the compost is ready
 - Screening
 - Use Finished Compost
 - Application to fields
 - Soil amendment for gardens
 - Surface mulch
 - Lawn topdressing
- Carbon Credits
- Buying Compost

Table 2. Composting methods: compare overall performance

Method	Cost	PFRP ¹	Time to finished compost
Windrow—front-end loader	Minimal added investment	May not consistently meet PFRP with infrequent turning	6–12 months
Windrow—windrow turner	Specialty equipment	Routinely meets PFRP in 15 days with 5+ turns	2–6 months
Aerated static pile (ASP)	Engineering, design consultation advisable	Routinely meets PFRP in 3 days	2–4 months. Usually ASP for 2+ weeks, until temperature drops. Then, curing for 1–3 months.

¹ PFRP is a composting process that meets prescribed conditions for human pathogen control. See page 18 for details.

Table 3. Composting methods: compare space requirements

Method	Space	Height	Width	Distance between piles
Windrow—front-end loader	Largest site	5–8 feet	Base: 12–18 feet	Aisles wide enough for bucket loader and other equipment.
Windrow—windrow turner	Intermediate	Dictated by turner height	Dictated by turner width	Depends on turner. Self-propelled units allow narrow alleyways. Wider aisles for tractor-mounted units. Aisle clean-up may be hand labor.
Aerated static pile (ASP)	Smallest site for active (hot) composting. Same area needed for curing as with other methods.	8–12 feet	Dictated by pipe and blower capacity	Saves space because PFRP is rapidly met and active composting area is reused more often. Compost can be put into larger curing piles after about a month.

Table 4. Composting methods: compare management tasks

Method	Feedstock mixing	Turning frequency	Adding water
Windrow—front-end loader	Materials must be well mixed prior to forming windrows.	Usually turned two or three times.	Hard to do when turning.
Windrow—windrow turner	Turning provides additional mixing. Turning usually reduces particle size and porosity.	Usually turned more than four times during active composting, and several times during curing.	Most turners can be equipped with a water supply hose to wet feedstock when turning.
Aerated static pile (ASP)	Feedstock must be well mixed and raised to the proper moisture level before the ASP is formed.	Mix when ASP is taken down and moved to curing site.	Cannot add water after ASP is formed. Can add water when moving compost to curing site. Forced air movement through ASP increases rate of water loss.

SOURCE: Agricultural Composting and Water Quality, Ohio State University Extension

Windrow or Pile Conditions – Optimal conditions for rapid, aerobic composting (Rynk)

Condition	Acceptable	Ideal
C:N ratios of combined feedstocks	20:1 to 40:1	25-35:1
Moisture content	40-65%	45-60% by weight
Available oxygen concentration	>5%	>10% or more
Feedstock particle size	< 1 inch	Variable
Bulk density	1000 lbs./cu yd	1000 lbs./cu yd
pH	5.5-9.0	6.5-8.0
Temperature	110-150 ^o F (43-66 ^o C.)	130-140 ^o F (54-60 ^o C)

Resources

- **The Art and Science of Composting**
<https://cias.wisc.edu/crop-soil/the-art-and-science-of-composting/>
- **On-Farm Composting Handbook**, Northeast Regional Agricultural Engineering Service and Cooperative Extension
<https://ecommons.cornell.edu/handle/1813/67142>
- **IL EPA: Waste Management – Composting**
<https://www2.illinois.gov/epa/topics/waste-management/Pages/composting.aspx>
- **Compost and the National Organic Program**
<https://www.ams.usda.gov/rules-regulations/organic>
- **City of Chicago Garden Composting Operations Rules - 2018**
https://www.chicago.gov/content/dam/city/depts/cdph/environmental_health_and_food/Garden%20Composting%20Operations%20Rules.pdf
- **Cook County Recycling permit**, www.cookcountyil.gov/service/solid-waste-and-recycling
- **Illinois Food Scrap Collation – Municipal codes**
<https://illinoiscomposts.org/start-composting/composting-for-officials/>
- **FSMA Produce Safety Rule: Documentation Requirements for Commercial Soil Amendment Suppliers**
<https://producesafetyalliance.cornell.edu/sites/producesafetyalliance.cornell.edu/files/shared/documents/FSMA-PSR-Documentation-Requirements-for-Commercial-Soil-Amendment-Suppliers.pdf>
- **Agricultural Composting and Water Quality**, Oregon State Extension
<https://catalog.extension.oregonstate.edu/em9053>
- **Types of Composting and Understanding the Process**
www.epa.gov/sustainable-management-food/types-composting-and-understanding-process
- **Design Considerations for ASP**
<https://www.biocycle.net/design-considerations-in-aerated-static-pile-composting/>
- **Aeration Floor Fundamentals**
<https://www.biocycle.net/aeration-floor-fundamentals/>
- **Composting Aeration Floor Fundamentals**
<https://www.biocycle.net/composting-aeration-floor-fundamentals/>
- **Building a Trommel Screen**
<https://conscious-compost.com/building-a-small-trommel-screen>
- **Vermicomposting for Businesses, Farms, Institutions & Municipalities**
<https://composting.ces.ncsu.edu/vermicomposting-2/vermicomposting-for-business-farms-institutions-municipalities/>
- **On-farm composting: Best Practices to Ensure On-farm Food Safety**. LSU AgCenter and Southern University Agricultural Research and Extension Centers
http://edit.lsuagcenter.com/~media/system/6/7/c/1/67c15464da8a3e23b85e6edf7035331f/15pub3460_onfarmcomposting_finalpdf.pdf.
- **Composting on Organic Farms** cefs.ncsu.edu/resources/composting-on-organic-farms/
- **Sovita testing** <http://solvita.com/compost.html>
- **Composting Council Seal of Testing Assurance**
www.compostingcouncil.org/programs/tmecc/
- **Connections: Is Compost A Player In Carbon Trading Markets?**
<https://www.biocycle.net/connections-is-compost-a-player-in-carbon-trading-markets/>
- **Connections: Reality Check On Carbon Trading And Organics Recycling**
<https://www.biocycle.net/connections-reality-check-on-carbon-trading-and-organics-recycling/>
- **Soils & Compost Resource List**, ATTRA, <https://attra.ncat.org/topics/soils-compost/>
- **Biocycle Magazine**, <https://www.biocycle.net/>