



Assessing and Interpreting Compost Quality

Shawn Bruckman

Why test your compost?



Summit for Recycling - Fort Collins, Colorado - June 3rd-5th, 2024

Testing is required for:

- ★ State & Federal Regulations
 - Heavy metals
 - Pathogens
 - Physical Contaminants
- ★ USDA National Organic Program
- ★ USDA Food Safety Modernization Act
- ★ Bagging/Claims



Testing is helpful for:

★ Selling your product!



Summit for Recycling - Fort Collins, Colorado - June 3rd-5th, 2024

Seal of Testing Assurance

- ★ CLARITY
- ★ CONSISTENCY
- ★ CONFIDENCE

Manufacturer Requirements

Certified Lab Requirements

Recommended Specifications for Use





US COMPOSTING
COUNCIL

Seal of Testing
Assurance

Barnes - Regional Composting
3511 West Cleveland Ave.
Huron, OH 44839
Telephone: 800-421-8722
Fax: 419-433-3555

Sample Date: 8/14/02

COMPOST TECHNICAL DATA SHEET

Compost Parameters	Reported as (units of measure)	Test Results	Test Results
<i>Plant Nutrients:</i>	% weight basis	% wet weight basis	% dry weight basis
Nitrogen	Total N (TN or TKN+NO ₃ -N)	.22	1.12
Phosphorus	P ₂ O ₅	.13	.21
Potassium	K ₂ O	.32	.50
Calcium	Ca	2.34	3.64
Magnesium	Mg	.57	.89
Moisture Content	% wet weight basis	42	
Organic Matter Content	% dry weight basis	31.31	
pH	unitless	7.4	
Soluble Salts <small>(electrical conductivity)</small>	dS/m (mmhos/cm)	3.49	
Particle Size	screen size passing through	1/2"	
Stability Indicator <small>(respiratory)</small> CO ₂ Evolution	mg CO ₂ -C/g TS/day, AND mg CO ₂ -C/g OM/day	.14 .5	
Maturity Indicator <small>(biological)</small> Percent Emergence, AND Relative Seedling Vigor	average % of control, AND average % of control	92 86	
Select Pathogens	PASS/FAIL - per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	
Trace Metals	PASS/FAIL - per US EPA Class A standard, 40 CFR § 503.33, Tables 1 and 3.	Pass	

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Directions for Product Use:

New Lawns: Apply a 1-2" layer to soil and incorporate to a depth of 5-7", apply seed, then rake and water.

Flower Beds: Apply a 1-2" layer to soil and incorporate to a 6-8" depth. Condition soil this way every year to 2 years. Plant flowers and water.

Trees & Shrubs: Dig a hole 2/3 the depth of the root ball and at least twice as wide. Mix 1 part compost with 2 parts soil obtained from the planting hole. Place the tree or shrub in the planting hole and apply amended soil around the root ball. Firm soil occasionally and water.

Topsoil Manufacturing/Upgrading: Mix 1 part compost with 2 parts existing or purchased soil and blend uniformly.

Growing Mixes: Planter box or raised bed mixes can be produced by mixing 1 part compost to 1 part pine bark and 1 part soil, sand or expanded shale. Potting mixes should contain 1 part compost, 1 part peat moss or pine bark, and 1 part perlite, vermiculite, styrofoam, or other aggregate.

Mulching: Spread a 2-3" layer around trees, shrubs, and flowers. Always avoid placing mulches against plant trunks and stems.

Garden Beds (food crops): Apply a 1-2" layer to soil and till to a 6-8" depth. Reapply each year, or as per soil test recommendations.

Note: The USCC does not assume whether or not, or to what extent, these directions are sound, sufficient or otherwise appropriate. It is the participant's responsibility alone to ensure that they are.

Compost Ingredients:

Yard trimming, food by-products

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Compost quality is defined in relation to its use



Physical Attributes & Characteristics Relevant for End Users

- ★ **Moisture**
- ★ **Organic Matter & Ash**
- ★ **Particle Size & Distribution**
- ★ **Bulk Density**
- ★ **Nutrient Content**
- ★ **pH**
- ★ **Soluble Salts**
- ★ **Inert Fragments**





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Stability Indicator <i>(respiration)</i> CO ₂ Evolution	mg CO ₂ -C/g TS/day, STD	.14	
	mg CO ₂ -C/g OM/day	.5	
Maturity Indicator <i>(assay)</i> Percent Emergence, AND Relative Seedling Vigor	average % of control, STD	92	
	average % of control	86	
Select Pathogens	PASS/FAIL - per US EPA Class A standard, 40 CFR § 201.32(a)	Pass	
Trace Metals	PASS/FAIL - per US EPA Class A standard, 40 CFR § 201.13, Tables 1 and 3.	Pass	

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Know your limits

Pathogen Limit

- Salmonella
<3 MPN per 4 grams

- Fecal Coliform
<1,000 MPN

*Colorado requires both as of 3/30/24

Heavy Metal Limits:

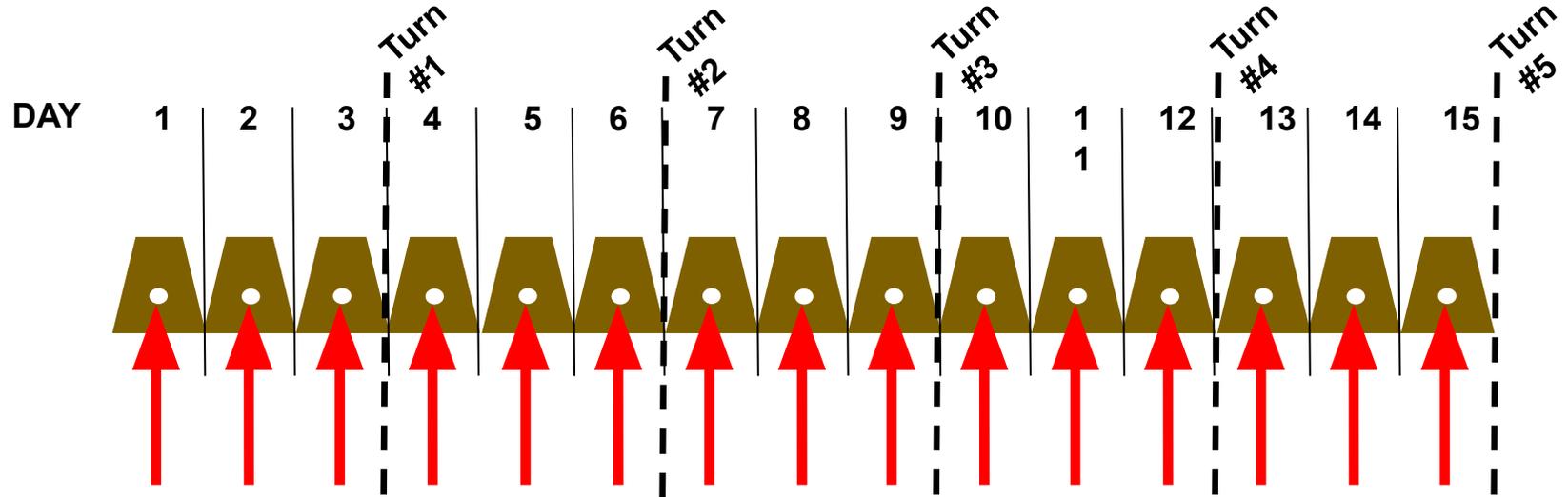
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2800



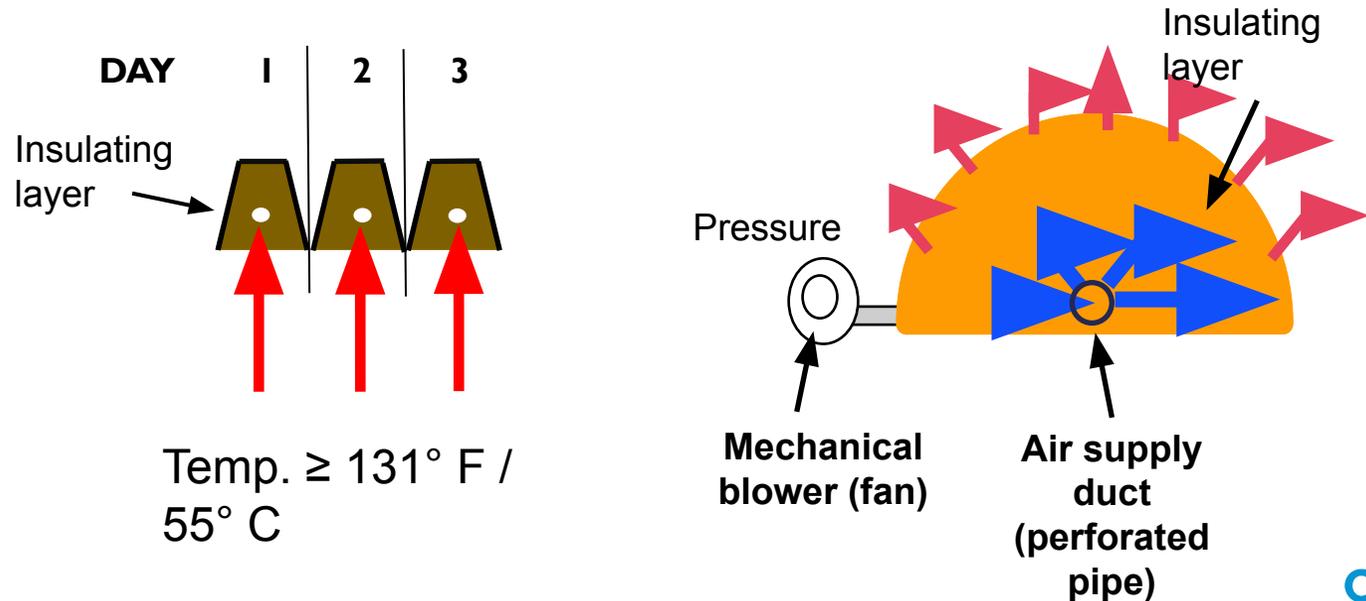
Process to Further Reduce Pathogens

Temp. $\geq 131^{\circ}\text{F}$ / 55°C

WINDROW



ASP





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Particle Size	screen size passing through	92"	
Stability Indicator <small>(preparatory)</small> CO ₂ Evolution	mg CO ₂ -C/g TS/day, AND mg CO ₂ -C/g OM/day	.14 .5	
Maturity Indicator <small>(biomass)</small> Percent Emergence, AND Relative Seedling Vigor	average % of control, AND average % of control	92 86	
Select Pathogens	PASS/FAIL per US EPA Class A standard, 40 CFR § 201.32(a)	Pass	
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Stability

The degree to which active compost is complete.

Measured by biological respiration:
CO₂

CO ₂ - C	Rating	General Characteristics
< 2	Very Stable	<ul style="list-style-type: none"> • Well cured, finished compost • No continued decomposition
2 - 4	Stable	<ul style="list-style-type: none"> • No odor production • Moderately well cured compost • Odor production not likely
4 - 15	Moderately Unstable	<ul style="list-style-type: none"> • Curing compost • Little to some potential for odor production • Aeration requirement reduced
15 - 40	Unstable	<ul style="list-style-type: none"> • Raw compost • Odor production likely • Moderate to high aeration required • Moderate to high potential for VFA phytotoxicity
> 40	Very Unstable	<ul style="list-style-type: none"> • Raw feedstock, unstable organic material • Odor production expected • Probable VFA phytotoxicity for most materials • Negative impact on soil C and N dynamics expected

TMECC Maturity Index

Tells us the degree in which curing is complete.

Other maturity indicators:

- Ammonia to nitrate ratio
- pH
- C/N ratio

VERY MATURE	MATURE	IMMATURE
Well cured compost	Cured compost	Uncured or raw compost
No continued decomposition	Odor production not likely	Odor production likely
No toxicity potential	Limited toxicity potential	High toxicity potential
No impact on plant-available soil nitrogen	Minimal impact on plant-available soil nitrogen	Significant impact on plant-available soil nitrogen



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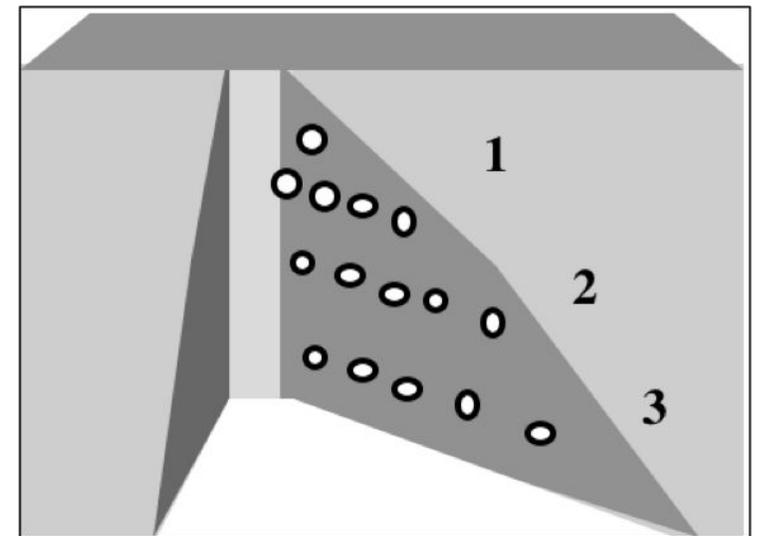
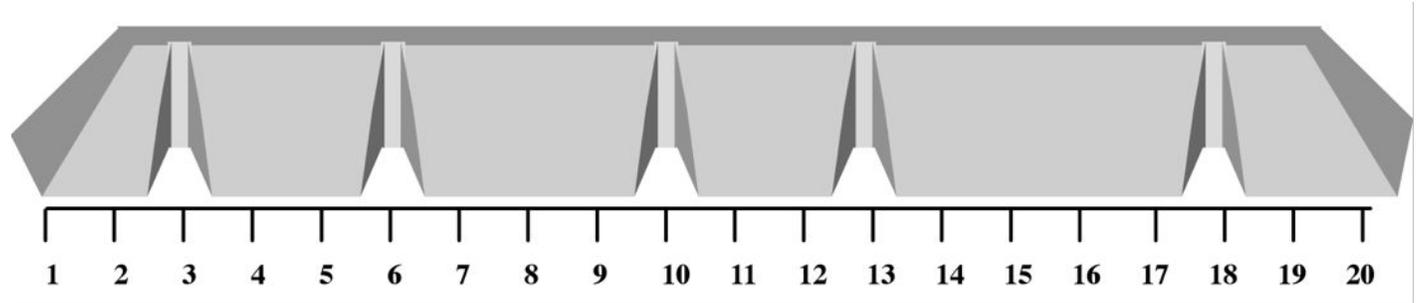
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Sampling Protocol

- Random Cut Outs
- At least 15 similar-sized sub-samples
- 1 gallon ziplock
- On Ice
- Overnight





Frequent Testing

Testing compost often is key to staying on top of understanding a product that is constantly evolving.

Manufacturers who produce:

Over 17,501 wet tons / year must test **monthly**

17,500 to 6,201 wet tons / year must test every **two months**

Under 6,200 wet tons / year must test every **three months**



Field Tests

Moisture

Bulk Density

Bio Assay

Solvita



Questions?



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970-331-2810

