

# Master Composting Program

OSU Extension

Lincoln County, Oregon

# Cooling Down

- Cooling starts when active composting is complete at about 100°F
- If you add O<sub>2</sub> or water, no rise in temperature
- Volume of original materials reduced by 25-50%
- Reduced decomposition continues to occur
- At ambient air temp, compost is ready for curing

100%

30-35%



# Curing Stage

- Takes about 30 days depending on your situation
- Curing helps stabilize organic chains in the material to stable state
- Allows re-colonization of compost by beneficial microorganisms

# Carbon Content

- Because of the presence of readily degradable carbon (C), most organic materials initially decompose rapidly.
- Thereafter, decomposition slows because the remaining carbon compounds, lignin and cellulose, resist decomposition when other environmental factors remain constant.
- Generally, the higher the **lignin content of organic materials**, the slower their decomposition

# Nitrogen Content

- Readily available or labile organic nitrogen (N) is mineralized, which means that it is converted to nitrate-N, a form that plants use, by microbial activity during the first weeks of decomposition.
- As the more labile organic N disappears, the most resistant form of N to microbial degradation (recalcitrant N) predominates in the organic N pool, and the mineralization rate slows down
- The predominance of recalcitrant organic C and N compounds in finished compost indicates a stabilization of the original organic material

# Impact on Soil Biological processes

- The “good bugs” (bacteria and fungi) when introduced to soil with compost fight the “villains” (pythium and phytophthora) resulting in good soils for plant growth
  - By outcompeting for life resources (water, air, nutrients)
  - Producing natural **antibiotics**
  - **Parasitizing** the villains

# Impact on Soil Biological processes

- The good bugs can also inoculate a host plant against diseases by inducing “**systemic acquired resistance**” in the plant
  - Natural defense against disease infection
  - Tricks the plant into **producing antibodies** and other protective chemicals before infection occurs
  - Same as **immunization** in humans through vaccination

# Advantages of Compost

- Increases soil organic and humic matter, and overall fertility
- Improves soil structure, aeration, and tillability so it better retains and uses water and nutrients
- Reduces soil bulk density so plants have deeper root penetration
- Improves the cation exchange capacity, which increases nutrient availability and reduces leaching
- Leads overall to soil aggregate stability, which allows the soil to function at optimum levels and produce the best yields

# How Much Compost To Apply

- Get a crop nutrient requirement e.g. use a soil test recommendation
- Test the compost for NPK
- Calculate based on either N or P recommendations depending on site

# Compost Application Formula

- The amount of compost to apply equals
  - The total priority nutrient concentration of the compost times the availability coefficient
  - AND THEN USE
  - the Recommended Amount of Priority Nutrient divided by the Plant Available Priority Nutrient

# Compost Application Formula

- For example, if compost contains 56 lb total N/ton (wet weight basis) and the availability coefficient is 0.25 (for incorporated material), then the plant available N is 56 times 0.25, or 14 lb/ton.
- If the priority nutrient is N and the recommended amount of N for the crop is 140 lb/acre, then the appropriate application rate is 140 (recommended amount) divided by 14 (plant available N), or 10 tons of compost per acre.

# Plant available N (PAN)

- The fraction of N that is available for plant uptake
- Use small farm organic calculator online
- The C:N ratio of mature compost is commonly in the range of 8 to 14:1.
- Composts with high carbon to nitrogen (C:N) ratios (20:1 and above) are relatively more resistant to further degradation.

# Nutrient Availability Guidelines

Table 2. Nutrient Availability Coefficient Guidelines for Composts



C:N Ratio	Nutrient Availability Coefficient		
	N	P	K
< 10:1	0.50	.8	.8
10 to 15:1	0.25	.6	.6
16 to 20:1	0.10	.4	.4
21 to 30:1	0.05	.25	.25
> 30:1	0.00	.10	.10

## Available N second Yr

- The availability of residual compost N to crop plants in the second year after addition is not well-documented. As a general rule, 10 percent of the remaining
- Consistent, annual applications of organic matter increase the amount of available nitrogen from compost in the soil.

# Organic Fertilizers

<b>Dairy solids</b>	<b>Concentrate's alfalfa meal</b>
<b>Yard trimmings compost</b>	<b>Wilbur Ellis Ground fish bone</b>
<b>Rabbit manure compost</b>	<b>Bio-Gro 7-7-2</b>
<b>School compost</b>	<b>Concentrate's soybean meal</b>
<b>Anaerobic ally digested dairy solids</b>	<b>Wilbur Ellis meat &amp; bone meal</b>
<b>Dairy solids compost</b>	<b>Wilbur Ellis bone meal</b>
<b>Yard trimmings</b>	<b>Bio-gro 8-5-3</b>
<b>Rabbit manure</b>	<b>Nature's Intent 9-3-4</b>
<b>Broiler litter</b>	<b>Wilbur Ellis fish meal</b>
<b>Broiler litter "compost"</b>	<b>X-Cel corn gluten meal</b>
<b>Bagged broiler litter</b>	<b>Pacific Calcium gran feather meal</b>
<b>Canola meal</b>	<b>Mermaid's Organic Fish Powder</b>
<b>Feather meal</b>	<b>Wilbur Ellis feather meal</b>
<b>Pelleted fish by-product</b>	<b>Wilbur Ellis blood meal</b>
<b>ACADIAN SEAWEED</b>	

 	Total % N from label ("as-is" basis) (% of product)	Total % dry matter (% of product)	PAN at 28 days (% of amendment total N, dry wt basis) from Table 1	PAN after full season (% of amendment total N, dry wt basis) from Table 1	P <sub>2</sub> O <sub>5</sub> (%)	K <sub>2</sub> O (%)	Ca (%)	Mg (%)	S (%)	B (%)	Cu (%)	Fe (%)	Mn (%)	Zn (%)
<b>UNCOMPOSTED MATERIALS</b>														
Alfalfa meal (2.5-0.5-2)	2.5	92	11	26	0.5	2.0								
Bat guano—high N (10-3-1)	10.0	90	60	75	3.0	1.0								0.0
Bat guano—high P (0-15-1)	0.0	89	0	0	15.0	1.0								
Blood meal (12.5-1.5-0.6)	12.5	91	60	75	1.5	0.6								
Bone meal (3-20-0.5)	3.0	95	17	32	20.0	0.5								
Chicken manure—dried (3.5-2-2)	3.5	85	32	47	2.0	2.0	7.0	1.0	0.5					
Corn gluten meal (9-0-0)	9.0	90	60	75	0.0	0.0								
Cottonseed meal (6-0.4-1.5)	6.0	90	60	75	0.4	1.5								
Feather meal (12-0-0)	12.0	93	60	75	0.0	0.0								
Feather meal (granulated) (13-0-0)	13.0	97	60	75	0.0	0.0								
Fertibor (15% B)	0.0	0	0	0						15.0				
Fish meal (10-6-2)	10.0	92	60	75	6.0	2.0								
Greensand (0-0-3)	0.0	97	0	0	0.0	3.0						0.0		0.0
Kelp meal (1.2-0.2-2.5)	1.2	88	0	5	0.2	2.5								
Meat and bone meal (7-8-0)	7.0	93	60	75	8.0	0.0								
Nature's Intent (9-3-4)	9.0	97	60	75	3.0	4.0	3.0		1.0					
Nutri-Rich (4-3-3)	4.0	91	36	51	3.0	3.0								
Perfect Blend (4-4-4)	4.0	90	37	52	4.0	4.0	7.0	0.7	3.0	0.0	0.1	0.1	0.1	0.5
Perfect Blend (7-2-2)	7.0	90	60	75	2.0	2.0	7.0	1.5	1.5	0.0	0.1	0.1	0.1	0.5
Soft rock phosphate (0-2-0)	0.0	99	0	0	2.0	0.0								
Solubor (20.5% B)	0.0	0	0	0						20.5				
Soy meal (6.5-1.5-2.4)	6.5	90	60	75	1.5	2.4		3.0						
Sulfate of potash (0-0-50)	0.0	99	0	0	0.0	50.0		0.0	17.0					
Sulfate of potash magnesia (0-0-22)	0.0	99	0	0	0.0	22.0		10.8	22.0					
Sup-R-Green (3-2-2)	3.0	73	32	47	2.0	2.0								
Zinc—Green Cypress (7% Zn)	0.0	0	0	0					3.4					7.0
<b>COMPOSTED MATERIALS</b>														
Composted dairy manure (1.5-0.5-0.5)	1.5	60	5	10	0.5	0.5	1.8							



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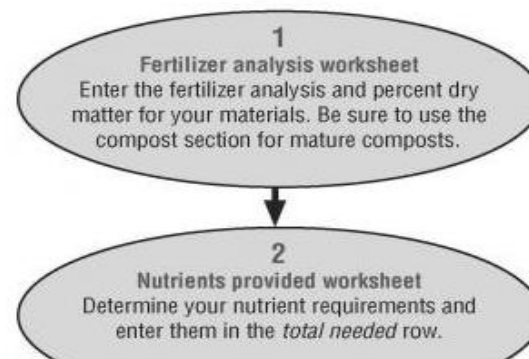
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## [User Guide: Organic Fertilizer Calculator](#)

[Download Commercial Calculator](#) (per acre calculations)  
[Download Small Farm/Garden Calculator](#) (square foot calculations)

## ORGANIC FERTILIZER CALCULATOR QUICK USER'S GUIDE

<http://smallfarms.oregonstate.edu/organic-fertilizer-calculator>



# OSU Organic Calculator

- [Go to the calculator](#)

# Using Finished Compost

- Lawn topdressing
  - Be sure compost is very mature to avoid harming the lawn
  - Use fine (screened) compost, ¼” depth raked over lawn
  - Best if lawn is cored before applying compost
  - Retains moisture, supplies slow release nutrients, prevents soil compaction
- For gardens
  - Compost must be very mature to avoid injury to plants
  - Use fine textured compost
  - Add up to 6 inches layer and mix with soil

# Using Finished Compost

- Potting mix
  - Compost must be very mature to avoid injury to plants
  - Use fine textured compost
  - Mix no more than 1/3 compost by volume
- As mulch
  - For trees, shrubs and flowers
  - Protects and enhances microbial populations