Compost Use Guidelines

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What is compost?

It is the product of controlled biological decomposition of organic matter. It usually involves an aerobic (oxygen-rich), high temperature process that kills pathogens and weed seeds and stabilizes organic matter. The final product bears little resemblance to raw materials from which it originated.

Benefits of Using Compost

1. Improves soil structure, porosity and density, creating a better plant root environment.

2. Increases infiltration and permeability of heavy soils, reducing erosion and runoff.

3. Improves water holding capacity, reducing water loss and leaching in sandy soils.

4. Supplies variety of macro and micronutrients.

5. May control or suppress certain plant pathogens.

6. Supplies significant quantities of organic matter that serve as a food source for soil organisms.

7. Improves cation exchange capacity of soils and growing media, improving their ability to hold and release nutrients for plant uptake.

8. Supplies beneficial organisms to soils and growing media.

9. Stabilizes pH.

10. Acts as filter for heavy metals and organic pollutants through metal binding and microbial degradation of organics.

General Compost Quality Parameters

Guidelines for acceptable ranges of quality parameters depend on specific end uses (e.g., container media, field nursery production, landscape mulch or bed liners, top dressing for turf and greens).

Property of interest	**Why is it important to measure**
Particle size	Affects porosity, determines suitability for specific applications
pH	Important for system management; how compost pH affects soil or media pH
Moisture content	Product handling and transportation issues
Soluble salts	Potential toxicity, affects watering regime, affects fertilizer rate
Stability/maturity	Effect on nutrient availability, odor generation, phytotoxic compounds
Presence of undesirable materials (inerts, weed seeds)	Aesthetic concerns
Concentrations of bioavailable heavy metals	Affects fertilizer requirements, potential toxicity; necessary to address public health concerns
Carbon content, C:N ratio	Determines application rates, basis to measure cost effectiveness
Macro- and micronutrient content (N, P, K, Ca, Mg, Fe, Zn, Cu)	Affects fertilizer rates
Bulk density	Product handling and transportation issues, estimation/conversion of application rates

Compost as a Growing Media Component in Container Mixes

Preferred Compost Characteristics for Container Growing Media

Parameter	Value Range
pH	5.5-8.0
Moisture content	35-55%
Particle size	½ " screen or smaller
Stability	Stable to highly stable; provide nutrients for plant growth; no substantial shrinkage
Maturity/Growth screening	Demonstrated ability to enhance seed germination and plant growth
Soluble salt concentration	3 dS (mmhos/cm) or less

Other variables that should be reported include nutrient content, water holding capacity, bulk density, organic matter content, C:N ratio.

Compost can be used as a substitute for peat in most potting mixes. For greenhouse mixes, the typical ingredients include peat (50%) perlite (25%) and vermiculite (25%). Compost can completely substitute peat (50% of total mix volume) or it could be split with peat (25% peat, 25% compost). Our greenhouse trials with vegetables and flowers show that either 25% or 50% compost in the potting mix produced more plant growth than the conventional 50% peat-based mix.

It should be noted that most peat-based greenhouse mixes have lime added to raise the pH of the growing media, since peat pH values are very low (3.5-4.5). When compost substitutes for peat in the potting media, there is no need to add lime since most compost pH values are near neutral to slightly alkaline (7-7.5). While some composts contain plant nutrients like nitrogen and phosphorus, we recommend using the same fertilizer application rates used for peat only-based mixes. The amount of nutrients released from the compost over the short time that plants are grown in the greenhouse is small enough that they shouldn't be credited to the media's nutrient supply ability.

For mixes used in outdoor container growing, the typical mix consists of peat, pine bark and sand. Some mixes contain composted bark, vermiculite and sand. Compost can be used from 10-40% of the total mix volume. If there is peat in the mix, it can completely replace the peat (usually peat represents 10-20% of an outdoor container mix). As with the greenhouse media, there is no need to add lime to raise the pH of the container mix, because the compost pH is neutral to alkaline.

In a study of ornamental shrubs (Dogwood, Juniper, Cotoneaster) grown with compost in the mix, all plant species grown with composted biosolids performed better than the standard potting mixes. The neutral to alkaline compost pH did

not result in iron deficiency. Compost produces chelators that enhance micronutrient availability. In another study where pine-bark sand container mixes were amended with 25 or 50% compost, woody ornamentals grew as well or better than mixes containing peat.

Compost Use in the Landscape

Beds

Amending planting beds around homes and commercial buildings is one of the widespread uses of composts nationwide. Adding composts to highly disturbed "urban" soils often produces beneficial effects on plant growth because these soils are typically low in organic matter, high in clay content and high in rocks and stones. Compost additions to these urban soils can improve soil physical properties (better drainage in clay soils, better water retention in sandy soils) as well as biological properties (adds beneficial soil organisms, can suppress plant diseases). Composts can also moderate fluctuations in soil temperature. The organic matter in composts evens out extreme wetness and dryness of soil, thereby maintaining moderate temperatures during the growing season.

Successful recipes for annual and perennial beds include 20-40% compost by volume incorporated into native soil or included in commercial topsoil mixes. This translates to 1-2" of compost incorporated (mixed using a rototiller or other type of home-scale tillage equipment) into the top six inches of soil. If the soil has a high clay content, you can add up to 4" of compost and incorporate into the top 6-8" inches of soil. These same rates can be used for establishing vegetable beds. After the first year of bed establishment with compost, you can add a 1" layer of compost annually to or 2" layer ever two years to maintain soil organic matter levels.

Compost quality parallels that for container media, soluble salts should be 2.5 dS or less. Soluble salts should not exceed 1.25 dS for seeds, young seedlings or salt-sensitive crops (e.g., geraniums).

To apply, spread a layer evenly over the area desired using rakes, shovels or a small front-end loader (big jobs). Incorporate mechanically using a rototiller or other type of soil mixing equipment. Once incorporated, let sit for 1-2 weeks (or up to 4 weeks) before planting. If you suspect that the compost has a high biological activity or soluble salts, you will want to wait to plant for at least 3 weeks after the compost has been incorporated.

Landscape Mulch

Aesthetic characteristics of compost as mulch are the most important features (color, texture, particle size). Coarser textured compost mulches may be more effective in reducing weed growth and preventing wind erosion than finer textured

products. The level of compost stability is much less important if the compost will NOT be incorporated into soil. However, very young (unstable) composts can contain high ammonium, salts or other phytotoxic compounds. These traits could suppress weeds but could also kill desired plants. Thorough watering of mulches before planting can leach out salts.

Typical application rates for compost mulches are 1-3" or 3-9 cubic yards per 1000 ft^2. Compost can be spread from a wheelbarrow or small dump truck. Evenly distribute mulch using a rake. In some cases, it can be blown onto to sites (particularly steep slopes where you don't want to run vehicles) using special blowing equipment. If applying compost mulch to already established tree plantings, avoid placing mulch directly against the tree trunk. If you are applying compost mulch to single trees or shrubs, it should be applied in circular pattern from the tree trunk to the drip line of the outer-most branches.

Backfill Mix

Researchers and industry professionals believe that amending backfill with compost encourages plant establishment and survivability. It may also reduce soil-borne disease damage. All professionals agree that plants transplanted into poor quality soils benefit from high quality organic amendments. Nutrient-rich (specifically N), highly stable composts are preferred. If planting bare rooted plant or salt-sensitive species (dogwood, azalea, rhododendron and other ericaceous plants), use composts low in soluble salts (<3 dS).

Turf Establishment and Top dressing

Composts of various feedstocks have been used successfully in turf establishment and renovation. Soils low in organic matter, nutrients and water holding capacity will benefit greatly from compost addition. Recent research has shown that use of high quality compost can degrade some turf pesticides over time reducing risks of water contamination. Other research has shown that composts can suppress turf diseases like rust and dollar spot, thereby reducing the need for pesticides to control these diseases. Fine particle size (finer than 1") is usually recommended to ensure good seed to soil contact.

<u>Application for turf establishment</u>
Evenly apply 1-2" layer of compost (3-6 cubic yards per 1000 ft^2) over the surface of the existing soil. For residential scale, compost can be applied by hand and spread over the surface with a rake. For larger areas (commercial spaces, parks, athletic fields, golf courses), compost should be applied with a manure type spreader. Specialized compost spreaders are available commercially (check with local farm equipment dealers). Once spread, incorporate the compost into the top 5-7" of soil using a rototiller (residential scale), rotovator or tillage disc (larger, commercial scale). The compost addition should be 20-30% by volume of the top 5-7" of the soil profile. Create a smooth seedbed by raking

or dragging the soil surface. Apply turf seed (use application rate guidelines provided by seed company) by broadcasting over the soil surface (by hand in residential applications or using a spreader in larger applications) and then lightly incorporating seed using a rake or drag. If using sod, it can be placed on the compost-amended soil and rolled to ensure good sod-soil contact. Apply starter fertilizer and water as needed to ensure proper establishment. Some composts will supply slow-release nutrients to the turf over time. However, you should use commercial fertilizers in turf establishment (especially during first few weeks of establishment).

Application for top dressing established turf

Use a fine particle size compost (< ½ "). Make sure that the moisture content of the compost is suitable for spreading with a box spreader (it should be moist but friable). Using a box or spinner spreader, apply a ½-1" layer of compost over existing turf. Irrigate or water after spreading compost to ensure contact with the soil.