Compost Usage

The idea that more compost is always better is pervasive in popular horticulture literature and media — and for good reason: Many home growers and organic gardeners who add multiple inches of compost each season have seen their gardens flourish. Urban farmers who seek to avoid soil contamination and have highly productive harvests often import truckloads of costly compost every year to create “ideal” growing conditions.

- Is heavy annual application of compost necessary?
- Are there drawbacks to applying too much compost?
- Do some composts have better uses than others?
- Can urban gardeners and farmers growing in small spaces have abundant harvests using less compost, thus decreasing input and labor costs?

By adopting specific compost application rates and a usage plan, it may be possible to lower compost inputs. Depending on your usage goal, an experienced composter might be able to produce enough compost onsite to meet their annual needs

Compost Types

In general, consider compost as a soil amendment that can improve the physical, chemical, and biological qualities of native agricultural soils or imported custom growing media (raised beds). Compost has a wide range of applications in food crops, landscapes, turfgrass, greenhouses, container production, and soil remediation.

Composts derive their name directly from the materials from which they are made:

- Leaves.
- Yard waste.
- Manure (chicken, cows).
- Food scraps.
- Biosolids.

Other products include vermicompost (worm castings), which are the manure (excreta) from worms, and black soldier fly compost, which is fly larvae frass and exoskeleton byproducts.

Considerations and Goals

For all types of compost, compost ideally should be stable and mature (finished) when applied. Immature, stable composts have more limited use, primarily as mulches. When choosing a compost type, consider its quality and feedstock ingredients, application rate and frequency, and intended use/ benefits.

Determine if its purpose is to:

- Build organic matter.
- Provide nutrients.
- Improve soil structure and water availability.
- Enhance biological activity.
- Suppress disease.
- Control weeds (mulch).
- Sequester carbon.
- Use in raised beds/containers.
- Manage stormwater/erosion.

While most growers may have several purposes for compost use, decisions will become clearer if the primary compost use goals are identified. While many advancements in understanding the diversity of microorganisms in compost have been made, and many studies have confirmed that some compost types can stimulate plant defense responses, the ecological functions and mechanisms that drive this are still not fully understood. Therefore, recommendations about biological inoculation or stimulation will not be considered here.

Application Rates

Before you decide how much and what type of compost to apply, test your soil or growing media to determine current soil nutrient levels. Application rates will generally be higher when establishing a new site.

It can be valuable to assess the relative importance of a type of compost against its intended use. This concept is represented in Table 1 on Page 3. For instance, a manure-based compost may have high importance as a nutrient supplier and amendment in potting blends. However, because of the elevated nitrogen (N) and phosphorus (P) levels in manure-based compost and the high application amounts needed to use compost as a mulch or a growing media, its importance as a mulch or growing media is low.

In many cases, a low importance value may also carry with it adverse environmental impacts for that compost type, use, and use rate.

Problems With Overapplication

Most composts, when applied at high rates, tend to load the soil with both nitrogen and phosphorus. Compounding this problem is the dominant form of nitrogen in compost. Nearly 90% of nitrogen in compost is in an organic form that must be mineralized by microbial activity before becoming available for the plants to use as nitrate.

In the first year of application, nitrogen availability from a compost application will be 20% at most. Following the "more is better" approach, growers often overapply compost to make up for that 80% nitrogen deficit.

However, phosphorous availability in the first year following compost application will be 50% or more. An overapplication of compost to raise nitrogen availability also raises phosphorus levels, increasing the opportunity for the excess phosphorus to move offsite. Excess phosphorus in our waterways causes algae to bloom, which inhibits oxygen and creates "dead zones," damaging ecosystems vital for aquatic life.

Key Takeaways

Follow the three steps below and use Table 1 on the following page to determine appropriate types of compost and application rates for your intended end use.

1. Evaluate your compost needs before applying compost by taking a soil test.
2. Choose a compost to apply that is appropriate for the end use. End uses may include:
    - Mulch.
    - Growing Media.
    - Potting Media.
    - Nutrient Provider.
3. Apply compost at a rate that balances the end goal and the environment.

Read the following scenario to understand how to use the steps above to determine compost type and the appropriate application rates for the situation.

Sample Scenario

A new raspberry planting could use mulching to suppress weeds to save labor and allow the canes to establish. A soil test has demonstrated adequate nutrient availability.

Identify Appropriate Compost Types

Look at the END USE column headings in Table 1. Since the end goal is mulching, review the "Mulch: Importance" column to determine which types of compost may be most suitable for this purpose. Two compost types reflect a high level of importance in a mulching end-use situation:

- Compost/Soil Blend.
- Leaf Compost.

Additional Evaluation

Recall that your soil test in this scenario showed adequate nutrient content. Evaluate the effect that application of those two compost types for mulching may have on soil nutrients.

- The Compost/Soil Blend is ranked medium-high importance as a nutrient provider.
- Leaf Compost is ranked medium-low importance as a nutrient provider.

Final Selection

In this example, the Compost/Soil Blend is likely overkill for your identified nutrient needs and might also be challenging and costly to source.

Unless you have detailed information on specific soil nutrient amendments that could be remedied by a custom Compost/Soil Blend, choose Leaf Compost to meet the needs of this project.

Application Guide

Since your primary goal in this scenario is mulch, find the intersection of Leaf Compost (row) and Mulch Use Rate (column). This cell indicates you should apply up to 4 inches per year as mulch.

Note: In subsequent years, your goals may change, so application rates may also change.

Table 1: Compost Application Rates by Type and End Use

Compost Type	End Use							
	Mulch: Importance	**Mulch**: Use Rate[1]	**Growing Media**: Importance	**Growing Media**: Use Rate[2]	**Potting Media**: Importance	**Potting Media**: Use Rate[3]	**Nutrient Provider**: Importance	**Nutrient Provider**: Use Rate[4]
Compost / Soil Bend *	High	Up to 4 inches per year	High	50:50 Blend	High	Up to 50%	Medium-High	1 inch
Leaf Compost	High	Up to 4 inches per year	High	50:50 Blend	Medium	Up to 50%	Medium-Low	1 inch
Yard Waste Compost	Medium	Up to 4 inches per year	Medium	50:50 Blend	Medium	Up to 50%	Medium	1 inch
Manure Based	Low	Don't Use	Low	30:70 Blend	High	Up to 30%	High	max 0.5 inch
Food Scrap Based	Low	Don't Use	Low	30:70 Blend	High	Up to 30%	High	max 0.5 inch
Vermicompost	Low	Don't Use	Low	30:70 Blend	High	Up to 30%	High	max 0.5 inch
Black Soldier Fly Compost	Low	Don't Use	Low	30:70 Blend	High	Up to 30%	High	max 0.5 inch
Potting Soil Mix Compost **	Low	Don't Use	Low	30:70 Blend	High	Up to 30%	High	max 0.5 inch
Biosolid Compost ***	Low	Don't Use	Low	30:70 Blend	Low	Don't Use	High	max 0.5 inch

Note: These rate guidelines are meant to give general maximum use rates for use primarily in food crops. Overlap occurs with most of these compost types and end uses in ornamental horticulture, turfgrass, nursery production, and environmental remediation. Ideally, decisions about compost use should be made using the results of soil/media fertility tests and a detailed compost analysis.

Footnotes

Compost Types

*Compost is often blended with high-quality top soil, sand, and other amendments to create an ideal imported growing media. Some commercial composters may also blend in specific nutrients or other amendments like gypsum, organic fertilizers, etc. This type of "custom compost" is more challenging to find. Ask your regional compost vendor if this type of service is possible.

**Spent or used potting soil is sometimes composted and reused as a stand-alone media or a compost product. This is very common with potting media-based microgreen growers that want to reuse their media.

***While biosolid compost can legally be used on fruit and vegetable crops if it meets the EPA Part 503 standard, it is generally not used on raw agricultural commodities like fruits and vegetables. Due to the current uncertainty surrounding PFAS contamination and other known but unregulated chemicals in biosolids, it is not recommended for edible food crop applications.

Application to nonfood crop landscapes and larger agronomic scale fields are likely less risky for human exposure. The EPA is currently conducting a PFAS human exposure risk assessment for publication in 2024.

Use Rates

[1] Manure, food scrap, and vermicompost should not be used as mulch to avoid excessive N leaching and P build-up.

[2] Compost is generally not used as a 100% media. 30-67% compost to 70-33% other ingredients (topsoil, sand, peat) is recommended depending on nutrient levels of compost. Higher nutrient level composts should be used at a lower ratio to soil.

If 100% compost growing media is experimented with, then using leaf compost or landscape waste compost blended with other composts or amendments is recommended to avoid nutrient loading issues.

[3] For potting mixes, usage between 30-50% is common depending on compost type/quality

[4] For composts used to provide nutrients, match Phosphorus (P) needs based on soil test to avoid excess build-up and potential runoff. If soil/media P levels are above optimum on soil test, avoid using compost at these rates.

References

The Composting Handbook: A how-to and why manual for farm, municipal, institutional, and commercial composters. Compost Research & Education Foundation.

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