

Using Dairy Manure Compost in the Urban Environment

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Dairy Compost Utilization

WHAT IS COMPOST?

Compost is an organically rich soil amendment produced by the decomposition of waste materials from landscapes, animal feeding operations, municipal wastewater treatment facilities, and food industries. A properly composted product is dark colored and does not resemble the original parent materials. It is generally composed of 50 to 80 percent hemi-cellulose and lignin, which are stable and slow to decompose plant components. The remaining 20 to 50 percent are water-soluble compounds that soil microorganisms quickly break down. Fully decomposed materials do not tie-up plant nutrients when mixed with soil or produce any undesirable odors. Compost provides a slow release source of nutrients and hence, in the past was called “black gold” by farmers.

BENEFITS

➤ **Environmentally sound method of recycling plant and animal wastes.**

Composting urban yard waste diverts plant materials from municipal landfills, which may reduce homeowners' utility fees. Composting animal wastes for urban uses removes manure from agricultural watersheds, which may improve water quality in impacted rivers and lakes.

➤ **Compost improves soil physical properties.**

Organic matter is an essential component of soil. As compost decomposes in the soil, it releases organic molecules that bind soil particles together increasing soil aggregation. As a result, water and air infiltrate clay-textured soils more easily and sand-textured soils retain more plant available water. Accordingly, these effects improve the root zone environment.

➤ **Compost can serve as a slow release source of plant nutrients.**

Plant or animal tissues used to produce compost inherently contain plant essential macro- and micro-nutrients. The composting process retains these nutrients, which are slowly released to plants during their life cycle as the compost decomposes in the soil.

➤ **Compost increases the nutrient retention capacity of the soil.**

Compost increases soil organic matter. Soil organic matter provides many cation exchange sites where plant nutrients are protected from being washed from the soil by rainfall or irrigation. The nutrients are held in the soil until they are utilized by the plant. Hence, compost increases the amount of plant nutrients retained in the soil root zone.



Soil physical properties like water infiltration and water retention capacity are improved as compost decomposes in the soil and releases organic matter. In turn, the root zone environment improves.

➤ **Compost suppresses plant diseases.**

Compost can control or suppress certain soil-borne plant pathogens such as Fusarium, Pythophthora, Pythium, and Rhizoctonia. The use of compost for disease control is theoretically sound, but its mode of action is poorly understood. Control of plant diseases by compost can be explained by five potential modes of action: (1) competition by beneficial microorganisms for space and nutrients; (2) antibiosis where beneficial microorganisms produce antibiotics that kill possible pathogens; (3) predation where beneficial organisms prey and feed on possible pathogens; (4) plant defense activation by elicitors in the composts; and (5) production of byproducts in the compost that are detrimental to possible pathogens.

TIPS ON URBAN COMPOST USAGE

Compost quality depends on the feedstock used to produce it. Table 1 provides an outline of recommended characteristics to consider when selecting an organic matter source.

Product stability, defined by the ratio of carbon to nitrogen (C:N), is particularly important because compost products can vary widely in their degree of decomposition. A properly stabilized (C:N < 25:1) material prevents nutrient immobilization in the soil. If unstable compost (C:N ratio greater than 25:1) is added to the soil, soil microorganisms will temporarily tie up plant available nutrients in the soil, especially nitrogen, as they break down the unstable organic matter. In the short term, this nitrogen deficiency can cause severe yellowing of plants.



A rotating basket type spreader is an effective unit for topdress applications of compost or any sand based mix. Its small size and ease of handling makes it effective for applications in small areas.

than loamy soils. Regardless of the soil type, it is important to begin with a laboratory analysis of the soil in order to determine pH, salinity, fertility levels, organic matter content and soil texture. The Texas Cooperative Extension's Soil, Water & Forage Testing Laboratory accessible at <http://soiltesting.tamu.edu> can provide a soil analysis that identifies existing nutrient levels in the soil, recommends additional fertility requirements and identifies potential salinity problems.

While several organic matter sources exist, not all provide plant essential nutrients. Typically, composted animal manures have higher nutrient levels than other composted materials. However, understanding the nutrient and salinity content of your product is critical in achieving the maximum benefit from the material. Excessive nutrients, especially phosphorus, can tie up micronutrients in the soil, causing plant deficiencies. Such deficiencies can occur with repeated heavy applications of high phosphorus composts. Certain poultry litter composts may contain excessive salinity, which can be detrimental to seed germination, stunt plant growth and cause premature death.

Most soils can benefit from the addition of compost, but clay and sandy soils benefit more

APPLICATION OF COMPOST

Compost is most easily used as a topdress for lawns and professional turf or as a mulch for bedded areas. Applying compost to the surface of the soil will reduce the risk of nitrogen immobilization by soil microbes due to unstable organic matter (C:N > 25:1). The compost will continue to decompose slowly on the soil surface. Rain and irrigation water will wash nutrients and organic compounds into the root zone. During the next growing season, this organic matter can be safely mixed into the soil prior to planting.

If the compost is stable and of good quality (as indicated in Table 1), then incorporating the material is the most effective method of adding organic matter to the soil profile. Prior to application, kill any existing perennial weeds or undesirable plants, with an appropriate herbicide. After two weeks or effective weed kill has been established, cultivate soil with a roto-tiller to remove annual weeds and rocks and breakup compacted areas. Apply a 1 to 4 inch layer of compost to the cultivated soil and incorporate to a depth of 8 to 12 inches. Determine nutrient content of soil and compost and apply synthetic fertilizers if required to meet additional nutrient requirements of selected vegetation. Also, apply lime or other soil amendments at this time if necessary. Rake and level soil surface to establish a smooth, firm planting bed and finally, plant seeds or transplants directly into prepared soil.

Table 1. Recommended characteristics of an organic matter source, specifically compost

Parameter	Optimum Range	Considerations
Moisture Content	40-50%	Material clumps when excessively wet and is dusty when excessively dry making application difficult.
Color	Dark brown to black	Feedstock sources such as rice hulls, sawdust, yard waste or manures should be fully composted.
Odor	No foul odor	Material should have an earthy smell.
Organic Matter	≥ 25%	Source should have no more than 75% ash content.
C:N Ratio	≤ 25:1	If C:N is too high, plants show nitrogen deficiency.
pH	6 - 8.5	
Heavy Metals	low	
Salinity Level	low	Lab should test for both salt level and salt type.
Particle Size	⅜ - ½ to incorporate - ¼ to top dress	Contaminants such as rock or other debris can damage mowing equipment in topdress material.
Nutrient Content	low to medium	Nutrient content varies. Establish application rate from soil nutrient requirements, specifically nitrogen and phosphorus, and the corresponding nutrient content of the organic matter source.