



Innovative Uses of Compost Erosion Control, Turf Remediation, and Landscaping

Compost has been viewed as a valuable soil amendment for centuries. Most people are aware that the use of compost is an effective way to improve plant growth. Compost-enriched soil can also reduce erosion, alleviate soil compaction, and help control disease and pest infestation in plants. These beneficial uses of compost can increase healthy plant production, help save money, reduce the use of chemical fertilizers, and conserve natural resources.

Compost used for a specific purpose or with a particular soil type works best when it is tailor-made or specially designed. For example, compost that is intended to prevent erosion might not provide the best results when used to alleviate soil compaction, and vice versa. Technical parameters to consider when customizing a compost mixture include maturity, stability, pH level, density, particle size, moisture, salinity, and organic content, all of which can be adjusted to fit a specific application and soil type.

Compost Technology to Control Erosion

According to the U.S. Department of Agriculture, the United States loses more than 2 billion tons of topsoil through erosion each year. Erosion occurs when wind and rain dislodge topsoil from fields and hillsides. Stripped of its valuable top layer, which contains many essential nutrients, the soil left behind is often too poor to sustain good plant growth. Eroded topsoil can also be carried into rivers, streams, and lakes. This excess sediment, sometimes containing fertilizers or toxic materials, threatens the health of aquatic organisms. It can also compromise the commercial, recreational, and aesthetic value of water resources. As a result, preventing erosion is essential for protecting waterways and maintaining the quality and productivity of soil.



Controlling Erosion in Construction and Road Building

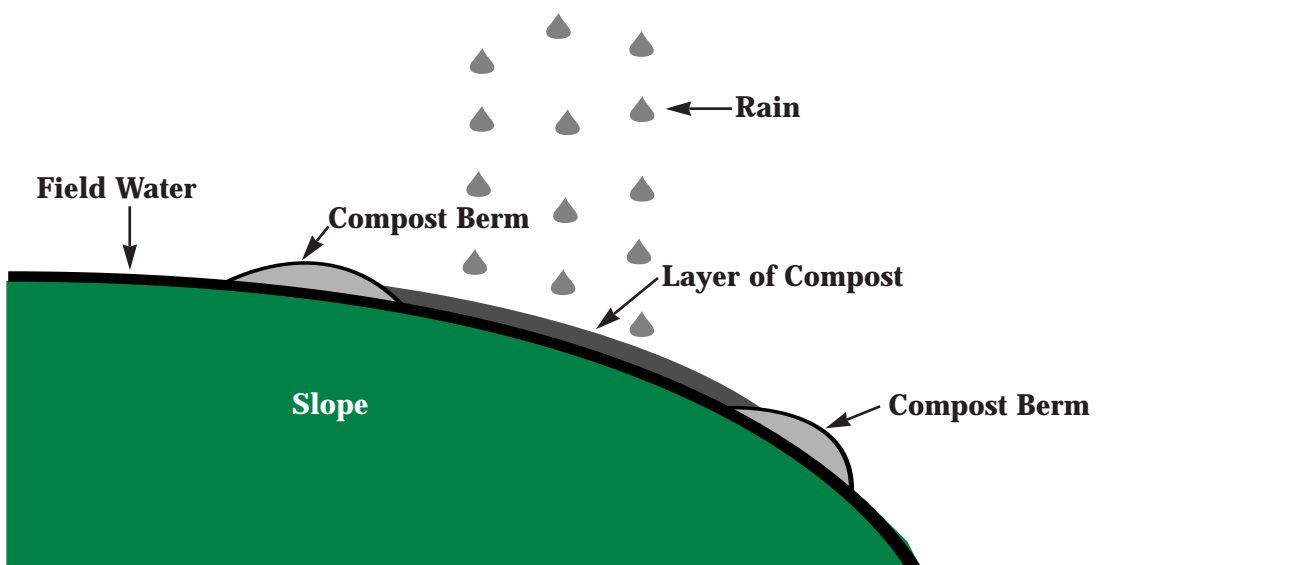
Erosion is a naturally occurring process; however, it is often aggravated by activities such as road building and new construction. At the beginning of some construction projects, all vegetation and topsoil is removed, leaving the subsoil vulnerable to the forces of erosion. On steep embankments along roads and highways, compost can be more effective than traditional hydromulch at reducing erosion and establishing turf because compost forms a thicker, more permanent growth due to its ability to improve the infrastructure of the soil.

Depending on the length and height of a particular slope, a 2- to 3-inch layer of mature compost, screened to 1/2 to 3/4 of an inch and placed directly on top of the soil, has been shown to control erosion by enhancing planted or volunteer vegetation growth. On steep slopes, berms (mounds) of compost at the top or bottom of slopes can be used to slow the velocity of water and provide additional protection for receiving waters. Because of its ability to retain moisture, compost also helps protect soil from wind erosion and during droughts.

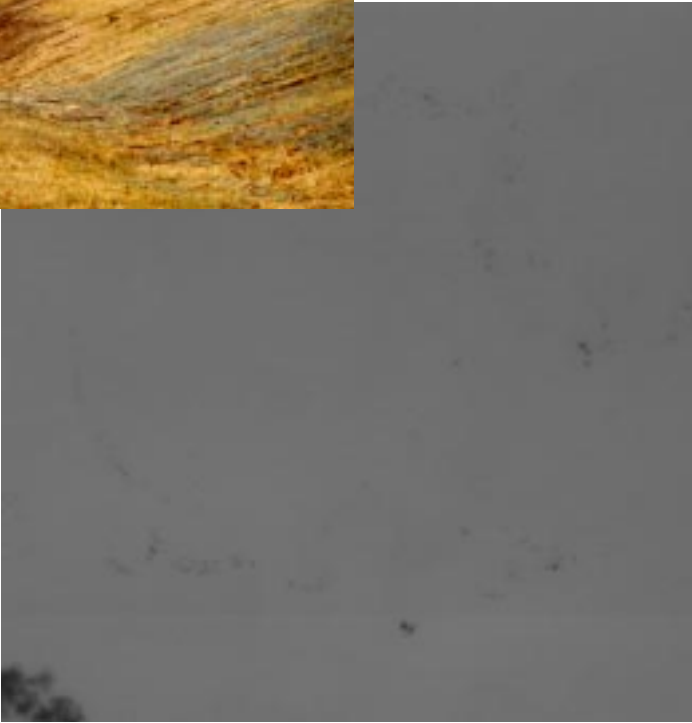
Controlling Erosion in Road Construction

The Federal Highway Administration (FHWA), of the U.S. Department of Transportation and the U.S. Environmental Protection Agency, recently conducted an erosion control demonstration project that compared mature yard trimmings compost that met FHWA specifications with hydromulch, a substance traditionally used for controlling erosion on roadside embankments. The purpose of the study was to determine the effectiveness of mature yard trimmings compost compared with hydromulch in establishing Fescue grass.

The project site was at a newly constructed intersection in suburban Washington, DC. Two embankments with steep slopes were selected. The first embankment had a 2 to 1 slope; the second had a 3 to 1 slope. A hydromulch/fertilizer treatment also was applied to a section of each of the slopes. Adjacent to these sections, 2-1/2 inches of mature yard trimmings compost was spread. On the 2 to 1 slope, a small amount of fertilizer was also applied, while the 3 to 1 slope was left unfertilized. Fescue grass seed was added and covered with a thin layer of compost to conceal the seed from birds.



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Photos courtesy of The Federal Highway Administration, Office of Environment & Planning, and Federal Lands Highway Program

Embankment adjacent to new intersection. Top left photo shows hillside before seeding. Photo at right shows grass cover. Compost-treated plot displays darker green color and thicker growth.

Results of the project revealed that compost used alone produced better results than either of the areas treated with hydromulch or the area treated with compost and fertilizer. While the areas with the hydromulch/fertilizer combination showed quick initial vegetative growth, the areas treated with only compost persevered within 6 months, out-performing the traditional method by establishing a thick, healthy vegetative cover. The growth in the compost/fertilizer plot was superior to that found in the hydromulch/fertilizer plots. A possible explanation for compost alone out-performing the area treated with compost and fertilizer is that chemical fertilizers often increase soil salinity, which in turn could negatively affect the beneficial micro-organisms in compost and inhibit the establishment of healthy grasses.

Using Compost to Remediate Turf Grasses

Providing safe, uniform playing surfaces for recreational activities, such as golf, football, soccer, and other field sports, requires intensive turf management. Recreational turf grasses are subjected to extensive wear and tear, making them difficult to manage and highly susceptible to turf diseases, pests, and soil compaction. To address these problems, turf managers traditionally use a combination of fertilizers, pesticides, fungicides, and aeration techniques that usually result in high costs and potential for negative environmental impacts.

Some turf managers are now using compost to replace peat moss in their topdressing applications based on its proven success in suppressing plant disease. Compost, when properly formulated, unlike peat moss, is teeming with nutrients and micro-organisms that stimulate turf establishment and increase its resistance to common turf diseases, such as snow mold, brown patch, and dollar spot. For example, after 3 years of using compost as a topdressing, the Country Club of Rochester, New York, has nearly eliminated the need for fungicide applications for such diseases.

Alleviating Soil Compaction

Soil compaction is another persistent landscape management problem, particularly in areas of heavy traffic, such as parks, zoos, golf courses, and athletic playing fields. Compacted soil impedes healthy turf establishment by inhibiting the movement of air, water, and nutrients within the soil. Bare soil, weeds, increased runoff, and puddling after heavy rains are the most obvious signs of a soil compaction problem.

Traditional methods for alleviating soil compaction—*aeration, reseeding, or complete resodding*—are labor-intensive and expensive, and

► What Are the Benefits of Using Compost?

Soil Enrichment:

- **Adds organic bulk and humus to regenerate poor soils.**
- **Helps suppress plant diseases and pests.**
- **Increases soil nutrient content and water retention in both clay and sandy soils.**
- **Restores soil structure after reduction of natural soil microbes by chemical fertilizer.**
- **Reduces or eliminates the need for fertilizer.**
- **Combats specific soil, water, and air problems.**

Pollution Remediation:

- **Absorbs odors and degrades volatile organic compounds.**
- **Binds heavy metals and prevents them from migrating to water resources or being absorbed by plants.**
- **Degrades, and in some cases, completely eliminates wood preservatives, petroleum products, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils.**

Pollution Prevention:

- **Avoids methane production and leachate formation in landfills by diverting organics for composting.**
- **Prevents pollutants in stormwater runoff from reaching water resources.**
- **Prevents erosion and silting on embankments parallel to creeks, lakes, and rivers.**
- **Prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.**

Economic Benefits:

- **Results in significant cost savings by reducing the need for water, fertilizers, and pesticides.**
- **Produces a marketable commodity and a low-cost alternative to standard landfill cover and artificial soil amendments.**
- **Extends municipal landfill life by diverting organic materials from the waste stream.**
- **Provides a less costly alternative to conventional bioremediation techniques.**

provide only short-term solutions. Some turf managers are starting to use compost and compost amended with bulking agents, such as aged crumb rubber from used tires or wood chips, as cost-effective alternatives. Incorporating tailor-made composts into compacted soils improves root penetration and turf establishment, increases water absorption and drainage, and enhances resistance to pests and disease. Using tailored compost can also significantly reduce the costs associated with turf management. Research conducted at a U.S. Air Force golf course in Colorado Springs, Colorado, for example, indicated that turf grown in areas improved with tailored compost required up to 30 percent less water, fertilizer, and pesticides than turf treated conventionally.

► Greening the Links

The U.S. Army Golf Course Operations Division at Fort George Meade, Maryland, and the U.S. Environmental Protection Agency began a 3-year pilot demonstration in 1995 to determine the effectiveness of compost amended with crumb rubber in alleviating soil compaction, erosion, and turf disease problems. The golf course superintendent estimates that using compost technology would save nearly \$50,000 a year in maintenance costs.



Photo courtesy of U.S. Army, Fort George Meade, Maryland

At the U.S. Army Golf Course at Fort George Meade, Maryland, erosion can clearly be seen on the untreated right side of the path, while rubber amended compost is helping keep erosion in check on the left.

Mature yard trimmings compost amended with crumb rubber was incorporated into compacted soils at 13 different locations around the two golf courses. Many of the selected sites included areas adjacent to, or at the end of golf cart paths, on slopes surrounding greens, or in tee boxes. These sites were selected because of their susceptibility to compaction and erosion caused by heavy traffic and water runoff. The compost mixture was tilled into the soil to a depth of about 3 to 5 inches and then uniformly seeded. To act as a control, one of the plots was amended only with crumb rubber.

In the first year of the pilot, course operators reported that healthy, green turf grass took hold at most of the sites, with no signs of compaction or erosion. Results were particularly impressive in eroded ditches along cart paths. The areas treated with the compost mixture showed full growth of turf grasses and total abatement of erosion, whereas the plot amended only with crumb rubber showed few signs of improvement.

Using amended compost can significantly reduce the costs associated with turf management.

Using Compost in Landscaping Activities

Supplies of high-quality, low-cost topsoil are declining, particularly in urban areas where the demand is greatest. Compost is, therefore, becoming particularly important in applications requiring large amounts of topsoil. Increasingly, compost is being used as an alternative to natural topsoil in new construction, landscape renovations, and container gardens. Using compost in these types of applications is not only less expensive than purchasing topsoil, but it can often produce better results when trying to establish a healthy vegetative cover.

After a lawn or garden has been established, maintaining it can be a challenge for both home gardeners and commercial landscape contractors. While aeration, topdressing, and chemical fertilizer applications are some of the techniques commonly employed in landscaping applications, compost can be a successful alternative. When used as a topdressing, or periodically tilled into the soil, compost can stimulate plant growth, reduce pests and plant infestation, and improve soil structure.

Compost is also an effective landscaping mulch. Placed over the roots of plants, compost mulch conserves water and stabilizes soil temperatures. In addition, compost mulch keeps plants healthy by controlling weeds, providing a slow release of nutrients, and preventing soil loss through erosion. Landscapers and gardeners also use compost as mulch because its dark, rich color accents the vibrant colors of flowering plants.

► Landscaping Constitution Gardens

In 1973, the U.S. National Park Service used a compost mixture made of digested sewage sludge, wood chips, leaf mold, and a small amount of topsoil to transform a badly compacted 40-acre tract of land located in Washington, DC, into a landscaped park. This project is one of the earliest successful large-scale landscaping applications using compost.

The original plans for the park renovations included planting azalea beds and thousands of annuals around a 6-acre lake. However, the site assessment revealed that the soil was almost as hard as concrete, with little pore space for plant roots and for water infiltration. The soil was too low in nutrients for healthy plant growth. In addition, the water table was high, causing flooding and root rot in existing plants.

Park Service staff spread over 9,400 cubic yards of the compost mixture over the site. Fertilizer, woodchips, and seed were added, and the soil was tilled to a depth of 2 feet. Impressed by the hardiness and beauty of a stand of hardwood trees along the area's western edge, Park Service staff decided to plant several varieties of native trees rather than the planned azalea beds. Data taken 3 years after the project ended indicated that most of the nearly 2,000 trees initially planted had flourished in the park.



Photo courtesy of U.S. National Park Service

More than 9,400 cubic yards of compost was used to remediate heavily compacted soil at Constitution Gardens in Washington, DC.



Photo courtesy of U.S. National Park Service

Three years after compost was applied, the vegetation at Constitution Gardens flourishes.

The compost use in this project not only improved the quality of the existing soil, but also saved taxpayers over \$200,000. Park Service staff also reviewed other options for remediating the soil at the park, including the purchase of topsoil to spread over the existing poor soil. If the Park Service staff had chosen to use topsoil, the cost of the project would have doubled.

► Using Compost for Rooftop Gardens

Several years ago, officials at Pace School in Pittsburgh, Pennsylvania, proposed building a playground and garden for their students. They soon discovered, however, that the only space available was on the school's roof, so they designed a unique rooftop garden.

Plans for the garden included building large, 6-foot deep planters. Before the planters were constructed, several important factors had to be taken into consideration. The planter mix used had to be light enough for the roof to withstand the weight, yet dense enough to prevent rapid evaporation caused by the wind and summer heat. In addition, the planter mix had to be able to endure freezing temperatures in winter, and provide adequate drainage to prevent the planters from overflowing during rainstorms.



Photo courtesy of AgRecycle Inc.

Tailor-made compost was the key to success for the rooftop garden at Pace School in Pittsburgh, Pennsylvania.

To meet these special needs, the school decided to use a tailor-made mature compost blend, chosen because its bulk density is much lighter than soil-based mixes. The compost mix is also extremely absorbent, maintains good drainage, and protects plant roots from climatic fluctuations.

A local compost producer tailor-made a mature yard trimmings compost mixture to meet the project's specifications. A layer of polystyrene packaging peanuts was placed in the bottom of each planter box to enhance drainage, and a 5-foot layer of the compost mixture was placed on top.

Four years after the project began, the school continues to use its rooftop garden for a number of activities, including teaching science classes and gardening methods. The compost has performed very well as a growing medium and continues to produce beautiful, healthy plants that both the students and teachers can enjoy.

◆ Using Compost in Landscape Maintenance

Each year, millions of people visit Point State Park in Pittsburgh, Pennsylvania. Heavy traffic and 12 continuous years of chemical fertilizer applications caused the park's grassy areas to become increasingly compacted, eroded, and depleted of vital nutrients.

After considering several options, park officials decided to aerate the grassy areas and apply a special blend of mature yard trimmings compost and fire calcined clay. This compost mixture was designed to alleviate compaction, add nutrients to the soil, and to improve water-holding capacity. Workers spread a 1/4-inch topdressing of the compost mixture and then uniformly applied grass seed. Soon after the compost was applied, park officials noted that the turf was healthier and that the soil no longer exhibited signs of compaction.

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