NebGuide
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Demonstration of Yard Waste Compost to Control Soil Erosion from Steep Slopes on Construction Sites

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Demonstrations using a commercial yard waste compost on 3:1 construction site slopes determined effectiveness and relative cost for preventing soil erosion. This NebGuide describes the processes and results.

Road, highway and building contractors need to prevent soil erosion from construction sites. Measures such as straw blankets and silt fences have been used effectively, but do not always provide a long-term solution. Using compost to aid in quickly establishing a grass cover can provide cost effective long term erosion control. A 2-inch blanket of compost spread over bare soil absorbs rainfall energy and prevents soil erosion, increases water retention to reduce water and nutrient runoff, and helps establish a healthy grass stand. Costs for compost application vary, depending on the method of application, but are comparable to straw blankets.

The test plots used LinGro® yard waste compost, produced from municipal grass cuttings and leaves by the city of Lincoln, Neb., and processed through a 0.5-inch screen. LinGro® is commercially available. Other composts with similar composition also should be effective.

Test Plot Demonstration

Six test plots, each 10 ft. x 30 ft., were established just outside Lincoln, Neb., on a 3:1 slope after the topsoil was stripped and the silty clay subsoil was tilled. These test plots were:

1. bare subsoil
2. straw mat
3. straw mat and silt fence
4. 2-inch compost blanket
5. 2-inch compost incorporated with rotary tiller
6. 2-inch compost incorporated and filter berm

All plots were seeded with tall fescue except for the bare subsoil plot, which was not seeded. No fertilizer was added to any plot. LinGro® compost was applied using a pneumatic blower truck. The filter berm was built 1.5 feet high by 3 feet wide at the base. Runoff and soil loss from natural rainfall and three rainfall simulations were measured between April and October, 2004. Rainfall simulations were created using a rotating boom rainfall simulator that applied rainfall at 2.5 inches per hour, equal to a 10-year storm in Lincoln. Grass and other vegetation growing in each plot were measured in June, July and October to determine whether compost aids in grass growth. A mass per unit area was measured for grass and non-seeded vegetation.

Rainfall and Runoff Results

A total of 22.0 inches of rainfall occurred on the plots from April 23 through October 23. This included 6.0 inches of simulated rain. The average rainfall for this period is 22.2 inches. The largest intensity natural rain event was 1.92 inches/hour.

Total runoff from April through October is shown in *Table I*. The bare soil plot had 7.5 inches of runoff and the two straw-mat plots had 3.6 and 5.4 inches. It usually required 0.5 inches of rain before runoff began. The two incorporated compost plots had less runoff; 2.5 and 2.8 inches. The 2-inch compost blanket absorbed the most rainfall and had a total of only 0.39 inches of runoff. Compost reduced water runoff amounts and this is partly why it was effective at reducing soil loss.

Soil Loss Results

Compost reduces soil erosion in three ways: 1) it reduces runoff by improving water retention; 2) it protects the soil from rainfall energy; and 3) it helps to establish a healthy grass cover, further protecting the soil. The total soil loss

Table I. Runoff, soil loss and plot installation costs. Total Rainfall was 22.0 inches during study period, April 23 - Oct. 23, 2004

Plot Treatment	*Total Runoff (in)*	*Total Soil Loss before full grass stand (lbs) 4/23–6/30*	*Total Soil Loss after full grass stand (lb) 7/1–10/23*	*Total Soil Loss (lbs) 4/23–10/23*	*Actual Plot Cost per sq. ft.*
Bare subsoil	7.5	330	660	990	$0.05
Straw mat	5.4	14	25	38	$0.30
Straw mat and silt fence	3.6	5.7	5.5	11	$0.34
2 inches compost incorporated	2.8	51	8.3	59	$0.45
2 inches compost incorporated and compost berm	2.5	15	1.9	17	$0.48
2-inch compost blanket	0.39	1.8	0.3	2.1	$0.41

from each plot is shown in *Table I*. The total soil loss from the straw mat and incorporated compost plots was similar. The 2-inch compost blanket reduced soil loss significantly compared to other treatments. Only 2.1 pounds of soil were lost with the compost blanket compared to between 11 and 59 pounds from other plots.

Grass and other vegetation growth helped reduce soil loss from the compost plots, but not from the straw mat plots. *Table I* shows soil loss before full grass stand (through June 30, 2004) and after full grass stand (starting July 1, 2004). Before the full grass stand, soil loss was greater from the incorporated compost plots than the straw-mat plots. But after full grass stand, soil loss was much less from the incorporated compost plots. Monitoring showed that the erosion and vegetation trends were the same in 2005 as they were at the time of the full grass stand in 2004. This shows an improved long-term benefit from using compost to help establish a good grass stand on steep slopes.

Vegetation Study Results

Figure 1 shows the vegetation study results. The compost plots produced more grass than the straw-mat or bare-soil plots, and produced eight times more total vegetation. No fertilizer was used, which was a disadvantage for the straw plots that did not have the plant growth nutrients provided by compost. Also, the compost plots retained more water, aiding grass survival during a dry period in August. Weed control by mowing or herbicides could have reduced weed growth and improved the grass stands.

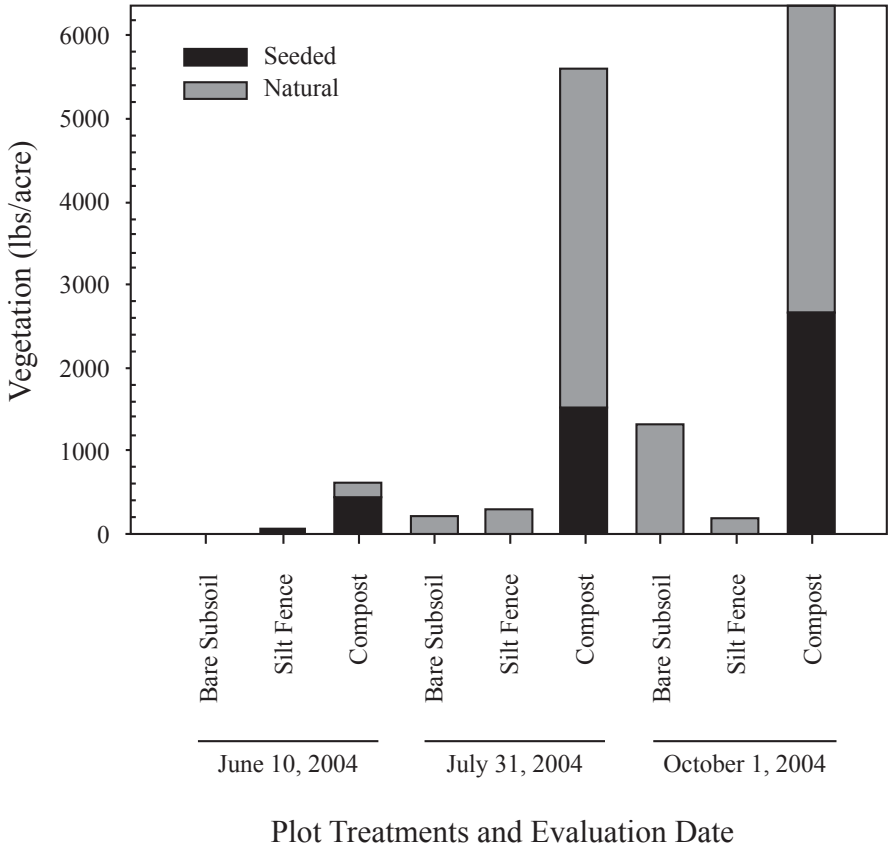

Figure 1. Vegetation growth comparison for three treatment types.

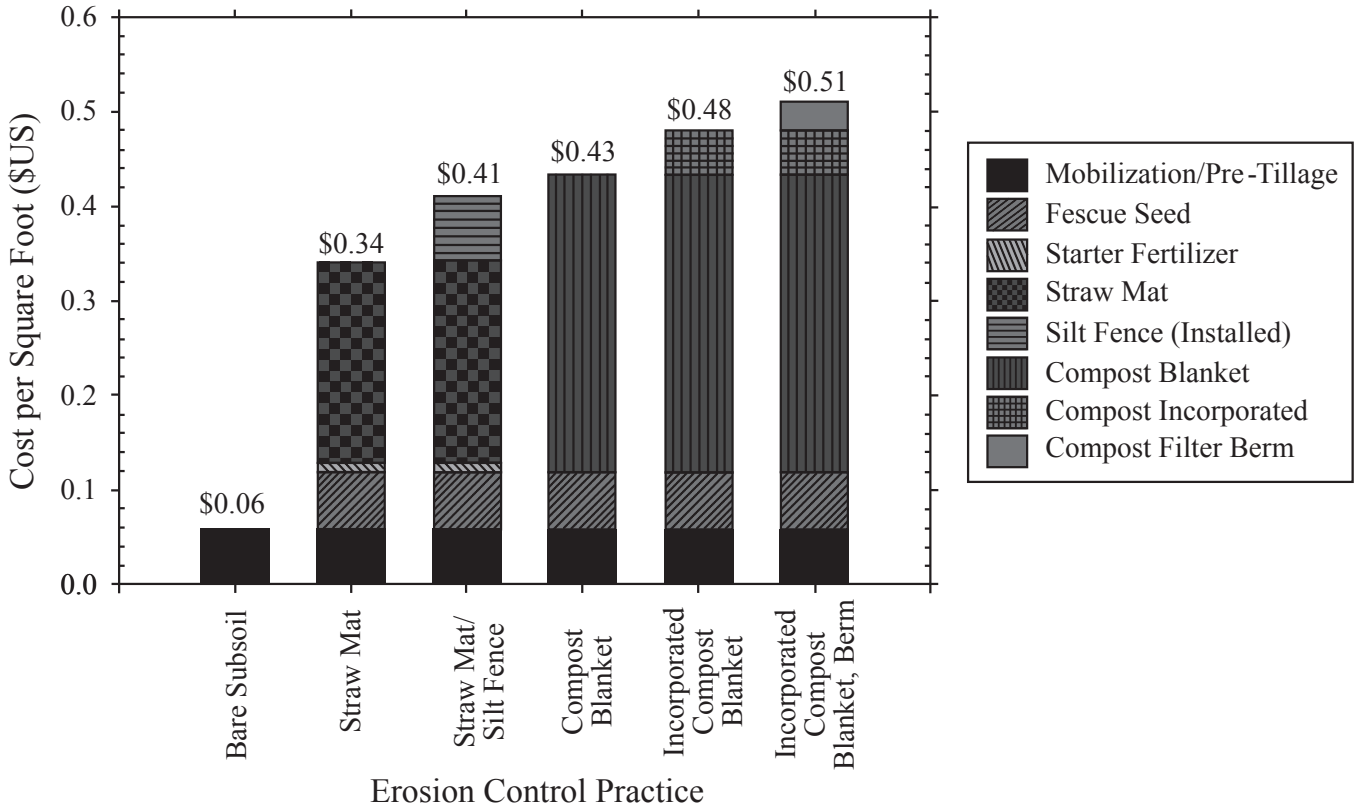

Figure 2. Estimated installation cost of erosion control practices. Unit costs obtained are for 2004 and for an area less than one acre.

Relative Cost Comparison

The actual installation cost for each plot is shown in *Table I.* This cost is a relative comparison only, and does not reflect the cost of use on a construction site. Cost ranged from $0.30 per sq. ft. for the seeded, straw-mat plot to $0.48 per sq. ft. for the seeded, incorporated compost with a compost berm. The compost was placed with a labor-intensive pneumatic blower. This was done because of the need for precise placement on the plots. Also, small plot installation costs usually are greater than costs for on-site applications. The cost for reseeding the straw mat plot is not included.

Figure 2 is a comparison of treatments using contractor estimated unit costs. This figure provides a more accurate comparison of what costs may be for an on-site application for areas less than one acre. Note that blowing on the compost blanket is the greatest cost of the compost treatments. Using a less costly application method, such as a mechanical spreader, could reduce costs for the compost treatments. Use of heavy equipment to apply compost may result in compaction of the material into a smoothly packed, erosion-prone surface. Care must be taken to avoid compaction when using heavy equipment.

To simplify technical terminology, trade names sometimes may be used. No endorsement of products is intended nor criticism implied of products not mentioned.

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