MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

Use of Compost for Permanent Vegetation Establishment and Erosion Control

WHAT WAS THE NEED?

After highway construction projects are completed, it is a common practice to cover slopes with topsoil, fertilizer, turfgrass, and straw to establish plant growth. This practice can be costly, for both materials and transportation of materials, and may potentially leach nutrients from chemical fertilizers into stream bodies during rainfall events. Thus, there is need for a more sustainable approach to slope stabilization.

Compost as an additive to soil has shown an increase in soil structural stability, aggregation, and water holding capacity, adding significant benefits to the stability of post-construction slopes. With proven improvements to slope and observed reductions in runoff volumes and sediment loss, compost use in transportation projects is increasing across the country,

WHAT WAS THE GOAL?

In this project, the potential benefits of compost use as a best management practice (BMP) for highway construction was investigated through two field sites and twelve greenhouse studies. Erosion protection performance of compost and compost/topsoil mixtures was evaluated through image-based coverage monitoring, physical data collection, and runoff analysis.

MAY 2019

REPORT NUMBER:
MD-19-SHA/UM/4-23

START DATE:
March 15, 2016

COMPLETION DATE:
March 31, 2019

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WHAT DID THE RESEARCH TEAM DO?

The performance of bisolids compost and greenwaste compost application as well as 2:1 topsoil:biosolids and 2:1 topsoil:greenwaste mixtures was evaluated at three slopes (20:1, 4:1, and 2:1). Grass establishment was measured through a simple and reliable computer-based procedure developed to quantify coverage at both the field and greenhouse sites. First-flush storm samples were collected to measure total nitrogen (TN) and total phosphorus (TP) while mesh bags were used to collect soil runoff at the two field sites. All runoff was collected in the greenhouse portion of this study and measured for TN, TP and sediments as well as N and P species.

WHAT WAS THE OUTCOME?

Three observed growth periods were included in the field element of this project. The field growth studies showed few significant differences between the soil media applications. Only biosolids (72% versus 37-60% at 90 days) at the Hanover site and topsoil (81% versus 60-69% at 87 days) at the Upper Marlboro site had significantly higher initial establishment percentages than the other applications, and none were significantly different after the first phase of growth..

According to both field and greenhouse observations, pure compost addition has the potential to greatly reduce the overall runoff volume, but the compost is rich in nutrients and was seen to leach both P and N at higher concentrations than the current practices. Mixing compost with topsoil produced a media with less total nutrients that produced lower leachate concentrations but had greater runoff volume.

For shallow slopes (20:1), compost use is advisable, the improved infiltration reduces runoff and the compost provides ample nutrients for grass growth. At slopes of 4:1 or greater, uncovered pure compost or compost/topsoil blends should not be used as this results in large nutrient and volume runoff.

HOW WILL SHA USE THE RESULTS?

MDOT SHA will potentially revise compost specifications in Nutrient Management Plans for seeding and sodding. Compost use as an alternative to chemical fertilizer will further be evaluated in greenhouse by observing additional ratios of compost/topsoil blends with straw cover in the Phase 2 study. The addition of straw will reduce soil sealing and promote increased infiltration while also protecting the soil from drying out. This will likely produce lower concentrations of nutrient loss as well as lower total runoff volume.

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