

## RESEARCH SUMMARY

# Understanding the Effects of Slope Ratio, Straw Mulching, and Compost Addition to Topsoil to Establish Permanent Vegetation and Reduced Nutrient Runoff

### WHAT WAS THE NEED?

Current MDOT SHA practices use approved topsoil, fertilizers, turfgrass seed, mix with straw cover for erosion control on highway construction projects. House bill 878 requires the use of more compost in MDOT SHA construction projects. Incorporation of compost could lead to improved vegetation and reduced runoff volume but may increase nutrient runoff loads. Further study of the percent compost incorporation, additional straw mulching, and effects over various slope ratios was necessary.

### WHAT WAS THE GOAL?

The goals of this study were to observe and identify critical elements involved in green vegetation establishment as well as runoff quality and volume from (1) media applications with additional SMPs (straw application), (2) compost blending with topsoil, and (3) variations in slope ratio.

### WHAT DID THE RESEARCH TEAM DO?

A series of greenhouse slope studies were used to compare two different composts (biosolids and greenwaste), four compost blends (2:1 topsoil: biosolids, 2:1 topsoil: greenwaste, 2:1 biosolids: topsoil, 2:1 greenwaste: topsoil), and the current MDOT SHA

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standard slope stabilization method (topsoil with seed, fertilizer, and straw). Many of these applications were tested with or without straw mulching and at a variety of different slopes. All runoff was collected in the greenhouse and analyzed for sediment and water quality. Sediment, phosphorus, and nitrogen mass loads in runoff were determined and compared under different scenarios. Vegetative cover was measured weekly to determine the effects of presented objectives on establishment rates.

### **WHAT WAS THE OUTCOME?**

Straw mulching, regardless of the applied media, resulted in reduced runoff volume and improved runoff quality, as well as improved vegetative growth. Compost addition with straw mulching produced similar or better runoff water quality when compared to the current MDOT SHA standard for both pure compost and 2:1 topsoil: compost blends. 2:1 compost: topsoil blends produced slightly larger runoff volumes and poor runoff quality compared to the MDOT SHA standard.

Slope angle did not largely affect the relationships of various media applications but did result in changes in concentration, mass export, and vegetation cover with steeper slopes resulting in larger total sediment and nutrient export as well as lower vegetative cover.

### **HOW WILL MDOT SHA USE THE RESULTS?**

MDOT SHA will review this research and potentially revise compost specifications in Nutrient Management Plans for seeding and sodding of open construction lands. MDOT SHA may use compost as an alternative to chemical fertilizer if such compost uses will not significantly increase nutrient leaching or nutrient runoff when compared with current fertilization practices.

### **LEARN MORE**

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