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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Biochar-amended Compost for Erosion Control and Stormwater Pollution Prevention

Erosion and Sediment Control measures

Design/ Construction

MAY 2026

Project Title: Biochar-amended Compost for Erosion Control and Stormwater Pollution Prevention

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Task Manager:
Akber Ali
Transportation Engineer (Civil)
Akber.Ali@dot.ca.gov

DRISI Division Chief:
Prakash Sah, PE
Prakash.Sah@dot.ca.gov

WHAT IS THE NEED?

Compost production and land application along roadsides can play a critical role in reducing landfill methane emissions, improving soil health, and reducing soil erosion and stormwater runoff. Under Assembly Bill (AB) 2411, the California Department of Transportation (Caltrans) is required to identify best practices for compost application to roadsides and to replace or supplement synthetic fertilizers used for highway landscaping with compost. In addition, California's Senate Bill (SB) 1383 requires the diversion of 75% of organic waste from landfills by 2025, and the majority of this material will be composted and land applied, with roadsides presenting a massive opportunity for compost distribution. However, sourcing compost that meets size distribution requirements for Caltrans is a key challenge, as much of the compost produced in California is too fine for erosion and stormwater mitigation applications. Furthermore, compost can be a source of pollutants such as microplastics, per- and polyfluoroalkyl substances (PFAS), and heavy metals, which could exacerbate soil contamination along roadways, which is already likely to be high. Pollutants leached from compost pose a threat to water quality as well as ecosystem and public health, and best practices should be implemented to minimize contamination to soils and water while maximizing the beneficial impact of compost.

The proposed work will test the potential of compost mixed with biochar, a carbon-rich soil amendment, to help meet compost size requirements, minimize contaminant leaching in soils, and improve erosion and stormwater runoff control.

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WHAT ARE WE DOING?

The intent is to acquire data to identify which methods and applications are best suited for biochar-amended compost, cost for implementation, and success rates for erosion control and stormwater pollution prevention. Assessing whether biochar production for use at scale in Caltrans construction contracts is a priority. This may be achieved by evaluating existing materials available by California biochar producers, including material specifications, cost, scale, biochar source material, and biochar material availability. Objective evaluation, testing, and comparison of biochar materials and biochar-amended compost for erosion control and stormwater pollution prevention applications may be necessary. Caltrans will implement results by developing new standards and specifications to utilize biochar in future Caltrans capital outlay construction contracts.

WHAT IS OUR GOAL?

Goals and objectives consist of the following:

- Determine whether compost can be amended with biochar to meet sizing requirements for medium and coarse compost that may not be available from California compost producers for use in Caltrans construction contracts.
- Determine whether biochar-amended compost can provide similar or improved performance for erosion control, soil health, and stormwater pollution prevention/water quality protection. If so, there is a need to determine the ideal mixture of biochar-amended compost that is best suited to these applications.
- Determine which biochar feedstock materials can be expected to provide better or different results than products currently in use for erosion control and stormwater pollution prevention in Caltrans construction contracts.
- Determine if there is potential for development of testing/certification criteria for biochar like that of the US Composting Council's Seal of Testing Assurance Program (STA), or if there is an alternative State-approved certification program to ensure accuracy of laboratory analyses for biochar for erosion control and stormwater pollution prevention.
- Determine the effectiveness of biochar when combined or blended with compost. Research must evaluate if it improves the performance, effectiveness, and longevity of compost when used in erosion control and stormwater pollution prevention applications (e.g., compost berms, socks, blankets, etc.).
- Determine the optimal ratio of biochar in compost to maximize benefits of both materials for vegetative purposes. This also includes what, if any, levels of biochar may negatively impact vegetative growth.
- Determine the potential for uptake of pollutants of concern, including microplastics, PFAS, and heavy metals, when biochar is combined with compost for erosion control and stormwater pollution prevention.

WHAT IS THE BENEFIT?

If the research results indicate that biochar and biochar-amended compost are suitable and successful for erosion control and stormwater pollution prevention applications, the use of this material for Caltrans construction contracts will be beneficial for California.

WHAT IS THE PROGRESS TO DATE?

The contract package has been submitted to Caltrans Division of Procurement and Contracts (DPAC) for their review and is pending contract execution.