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Effectiveness of Native Vegetation Planting Techniques to Minimize Erosion

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ABSTRACT

Vegetation plays a key role in decreasing soil detachment and transport from project sites. Vegetation promotes long-term protection of the soil surface via leaf cover and root establishment, provides a viable alternative to many synthetic means of erosion control, increases biodiversity, and supplies aesthetic value to sites. However, native vegetation can be a challenge to establish in disturbed soils. Successful establishment relies on proper moisture availability, appropriate nutrient levels, adequate soil structure, and suitable planting techniques.

The California Department of Transportation, Office of Landscape (Caltrans), and the Office of Water Programs, California State University, Sacramento (OWP), conducted a study with the staff at the Erosion Research Facility at California Polytechnic State University, San Luis Obispo (Cal Poly) testing the performance of various planting techniques. This study

compared flats or sod strips, plugs, hydroseed, and compost applications by measuring the effect of each on vegetative cover, erosion, and water quality.

The techniques were applied to boxes filled with clay loam soil and set at a 2H:1V slope. Combinations of techniques were: flats or plugs on top and toe, flats or plugs on toe only, and hydroseeding. Species composition of the flats and plugs included *Bromus carinatus* (California Brome) and *Achillea millefolium* (Common Yarrow). The boxes were exposed to natural rainfall recorded by an onsite weather station, as well as simulated rainfall that mimicked a 50-year storm event. Runoff was collected and analyzed for total runoff, sediment load, sediment concentration, pH, and salt concentration. Understory and overstory vegetative cover was measured using a modified transect method.

Planting on the top and toe removed 99% and 85% of the sediment produced by bare ground and hydroseeding alone, respectively. This suggests that successful establishment of vegetation on the top and toe is crucial. Flats consistently performed better than plugs, removing 80% more sediment and producing more native vegetative cover. Jute and compost decreased sediment load, but inhibited plant growth. Compost did not give native vegetation an advantage over weedy annual vegetation. Higher pH and salt concentrations were detected in the runoff from boxes treated with compost, but the levels were not harmful to plants.

Planting techniques greatly affect the success of vegetative establishment in removing sediment from runoff, increasing infiltration, and promoting vegetative cover. Therefore, careful consideration must be given to how vegetation is planted on construction sites and disturbed soils.

Key Words: erosion control; native vegetation establishment; water quality; composting; flats, plugs, and hydroseeding