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Vegetation Establishment For Erosion Control Under Simulated Rainfall

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Abstract

The California Department of Transportation (Caltrans) manages rights of ways that transect 41 m H (101m ac) and span over 3000 m (9000 ft) in elevation from seashore to sup alpine. There are approximately 4,900 native and 1,000 naturalized alien plant species in California. Only a few hundred are reliably useful in erosion and sediment control. Specifying native and naturalized vegetation mixes for use in hydroseeding or plug planting in conjunction with mechanical erosion control methods can have varying result for minimizing accelerated soil erosion. To investigate these factors, Cal Poly, San Luis Obispo, in conjunction with Caltrans and CSU, Sacramento, conducted a study establishing vegetation using hydroseeding and plug planting with erosion control practices of crimped straw, jute netting, gypsum, BFM, and guar tackifier. The vegetative treatments included native vegetation from Caltrans District 5, *Bromus carinatus* (California brome) seeds and plugs, a typical naturalized erosion control mix from Farm Supply, existing seed bank, mostly *Lolium multiflorum* (rye grass), and two control boxes left untreated. Percent cover and runoff quality were measured for each box.

The goal was to identify initially fast growing vegetation that establishes within 70 days and demonstrates long-term erosion control. Treatments were conducted in 0.6 by 2 m soil test boxes set at a 2:1 (V:H) slope. Seeding rates were typical for District 5 and plugs were planted at 22 and 44/m². Boxes were filled with a sandy clay loam (USDA) soil typical of District 5 fill slopes, compacted to 90 %. The rainfall simulators mimicked a 30-year storm along the California coast with 1.5" of rain in 1.5 hours.

The highest percentage of vegetation was with the native seedings and plugs, with jute and straw consisting mostly of legumes and forbs. The EC mix and gypsum produced the least amount of grasses. The EC mix and BFM were very dense stands of legumes. Gypsum and tackifier treatments were relatively bare. Native plants were poorly established in all treatments. The plug plantings were well established.

The lowest runoff sediment concentration was with both the native and EC mix seedings and jute, followed by BFM, plugs and jute and finally jute alone. The range was 7.8 to 1,0002.5 mg/L. The highest runoff sediment concentration was the existing vegetation and guar tackifier, crimped straw, gypsum, and bare soil. The range was 6,921.4 to 46,894.2 mg/L.

Key Words : Establishing Native Vegetation for erosion control, Hydroseeding vs. Plug Planting, Rainfall Simulators, and Caltrans