Evaluating Native Hawaiian Plant Species' Contributions to Post-Fire Silt Sock Bioremediation in Lahaina

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The August 2023 Maui fires destroyed historic Lahaina town, causing toxic ash to become mobilized into the soil, groundwater, and ocean. This study evaluated the benefits of incorporating native Hawaiian plants into the design of bioremediation silt socks. Plants were selected based on phytoremediation properties, and suitability to the arid environment of Lahaina. We tested the effectiveness of these plants to (1) create a more favorable environment for the bioremediation bacteria and fungi, and (2) improve the structure of the socks (material retention). Testing was conducted in two phases: (1)pili/control, (2) milo/naupaka/matured pili/control. In each phase, internal moisture and temperature were measured through three separate trials. Each trial lasted three days, with measurements taken five times a day. Moisture was tested using frequency domain reflectometry, and temperature through digital probe. Subsequently, the socks were subjected to a shake test using a constructed shaking table, followed by the collection and recording of expelled particles. Testing results showed significant improvements over the control in moisture levels (phase1 pili +69.33%, milo +18.85%, naupaka +20.83% , phase 2 pili +48.98%), temperature (phase 1 pili -0.44C, milo -0.03C, naupaka -0.65C, phase 2 pili -0.91C), and material loss (phase1 pili -50% , milo -0.99%, naupaka -38%, phase 2 pili -34%) The contribution of our study is improvement of the bioremediation silt sock design and function. Further implications include cost and resource savings due to lower water demands and reduction in loss of sock material.

Awards Won:
Third Award of $1,000