

Fiber Rolls as a Tool for Re-Vegetation of Oil-Brine Contaminated Watersheds

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Title: Fiber Rolls as a Tool for Re-Vegetation of Oil-Brine Contaminated Watersheds

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Project Amount: \$70,740

Research Category: Brine Scar Remediation

Description:

Historic oil brine scars (sites that repeatedly received produced water) are extremely difficult to remediate because these sites possess degraded, highly saline soils, erosion damage, little or no plant cover and an altered microbial community. Ecosystem function is diminished as a result of these impacts.

We are evaluating the contribution of fiber rolls to restoration of a historic oil brine scar in south Arkansas. Four treatments (natural attenuation, standard soil reclamation techniques, fiber rolls, and soil reclamation with fiber rolls) have been applied to plots within the site. Fiber rolls are tubes formed with a geotextile material and filled with organic fiber, mycorrhizal fungal inoculum, bacterial inoculum (soil) and salt-tolerant plants. Consequently, fiber rolls may serve a variety of ecological functions including primary productivity, filtering of sediments and moisture and nutrient retention. Rolls also serve as a source vegetative growth, seeds, microbial spores, organic matter and nutrients.

Objective(s) of the Research Project:

Our primary objective is to examine the utility of fiber rolls as an effective, inexpensive, and easy-to-use remediation tool at oil brine spill sites. Established fiber rolls and adjacent brine affected plots will be examined to determine the:

- 1) Structural integrity and ability of fiber rolls to withstand periodic flooding/water flow,
- 2) Amount of sediment accretion behind fiber rolls,
- 3) Survival, extent and type of vegetative growth in fiber rolls, and
- 4) Type and extent of vegetation expansion from fiber rolls onto adjacent soils.

Soil reclamation as a result of treatments will also be assessed through measurements of electrical conductivity, sodium adsorption ratio, and cation exchange capacity.

Progress Summary/Accomplishments:

Little field work was accomplished during the quarter. Fiber rolls established in November, 2005 continue to support plant growth in an otherwise barren brine scar. Little additional field work is anticipated until post treatment soil samples are collected and rolls are assessed for integrity and plant cover at the end of the study period.

Seeds of *Cynodon dactylon*, *Panicum virgatum*, *Trifolium repens* sown onto roll surfaces during the last quarter were informally monitored. Significant germination on roll surfaces was noted. Heavy deer browse, as evidenced by deer tracks and plant appearance, continues on fiber roll plants and plants growing in treatment plots. Small wire screens placed over fiber rolls to protect new plants are effective at deterring some browsing. However, plants growing through the wire screens along with plants growing on treated soil surfaces are heavily cropped.

Rolls were monitored for integrity. No roll breaks occurred.

Plant cover in plots that received tilling, chicken litter, hay and fiber rolls continues to flourish. Plot surfaces that received no treatment along with surfaces in plots between rolls without soil treatments continue to be devoid of plant cover. Noticeable this quarter is the increase in forb diversity within treatment areas.

Publications/Presentations

Future Activities:

Post-treatment soil samples will be collected next quarter and analyzed for differences in pH, EC, P, K, Ca, Mg, S, Na, Fe, Mn, Zn, Cu, B, Cl, NO₃, NH₄, and total carbon.

Soil accretion will be assessed in the fall to determine if our fiber roll "dams" are effective at reducing sediment runoff.

Supplemental Keywords: Brine restoration; Historic Brine Scar; Fiber Roll; Bioremediation.