Task 5.3 Assessment and Potential for Vegetative Remediation of Selected Brown Marsh and Disturbed Sites in the Barataria and Terrebonne Basins
Critical Area Treatment Plots

By
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Introduction

Wind driven waves pound shorelines and wakes from boats scour soil and plants from wetlands bordering bays, barrier islands, and bayous. Vegetative plantings have proven successful to slow the rate of shoreline loss and in many instances regressing shorelines have been halted and stabilized. The success of planting shorelines is mainly associated with low energy sites. Moderate to high wave energy shorelines are difficult to establish and this is where most failures occur.

Geotextiles have been used to stabilize eroding slopes for years. Broadcasting seeds and anchoring with woven fiber mats is a common practice. Impregnating fiber mats with vegetation is a more recent method that is being used. The purpose of this study is to evaluate wetland herbaceous plant species impregnated in commercially available biobased geotextiles.

Materials and Methods

Five commercially available geotextile fiber mat materials were used to test the rooting and establishment of important plant species used for shoreline stabilization. Seeds and vegetative propagules of *Spartina alterniflora* Loisel. (smooth cordgrass), were planted in each type of fiber mat. Vegetative propagules of *Paspalum vaginatum* Sw. (seashore paspalum), *Schoenoplectus californicus* (C.A. Mey.) Palla (Giant bulrush), and *Zizaniopsis miliacea* (Michx.) Doell. & Asch.(Giant cutgrass) were also evaluated.

Geotextile mats used for this trial include:

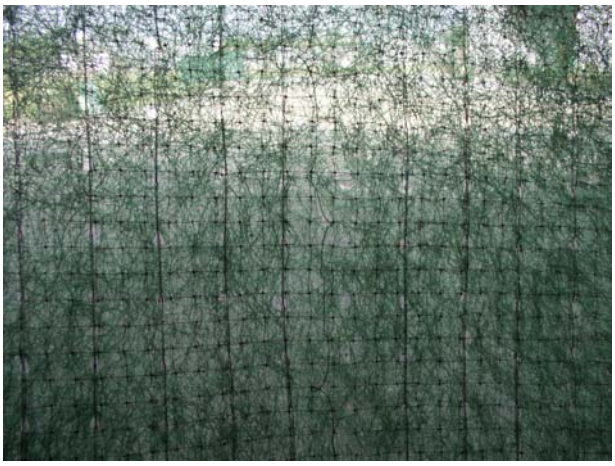
Figure 1. Wood fiber mat (6 mm thickness)

Figure 2. Coconut fiber mat (1 cm thickness)

Figure 3. Coconut fiber mat (5 cm thickness)

Figure 4. Coconut fiber blanket (6 mm thickness)

Figure 6. Synthetic fiber mat (6 mm thickness)



Geotextile mats were cut to fit shallow fiberglass trays and placed in a greenhouse for grow out. Trays were kept flooded just enough to cover the fiber mat.

Figure 7. *Spartina alterniflora* seeds were broadcast over each mat type with 70 pure seed units per square foot.

Figure 8. Vegetative propagules, single stems with roots, were place in slits cut through each mat type on 15 cm centers.

Figure 9. *Paspalum vaginatum* propagules planted to wood fiber mat.

Figure 10. *Schoenoplectus californicus* propagules were placed in slits cut in the mat on 15 cm centers.

Figure 11. *Zizaniopsis miliacea* propagules placed in slits on 15 cm centers.

Results

Seed and vegetative propagules of *S. alterniflora* were easily established in the geotextile fiber mats used in this trial. *P. vaginatum* proved to be the easiest of the species used, while *S. californicus* and *Z. miliacea* proved to be more difficult to establish but they can be used successfully.

Vegetative establishment, grow out period, handling, and transportation of geotextile material types are important. The type of geotextile should be considered based on the anticipated use and plant species desired to fit a particular site. Wood fiber mats deteriorated rapidly and they were difficult to maintain in the wet grow out conditions needed for the aquatic species tested. The coconut fiber mats and the synthetic materials were easy to maintain and performed well throughout the grow out period. Handling and ability to maintain structure during transport to installation sites was best with coconut and synthetic fiber materials. The wood fiber mats did not hold together and were difficult to handle even with a well rooted plant mat. The best performing fiber materials were the 1 cm and 5 cm coconut mats. Plant density and root development was best in the 1 and 5 cm coconut mats and fair in the fiber blankets and wood mats. Best overall root and aboveground stem growth was found in the 5 cm coconut mat.

Figure 12. *Spartina alterniflora* seedlings established in 5 cm coconut mat.

Figure 13. *S. alterniflora* seedlings in 1 cm coconut mat

Figure 14. *Paspalum vaginatum* in 1 cm coconut fiber mat.

Figure 15. *Zizaniopsis miliacea* in 1 cm coconut fiber mat.

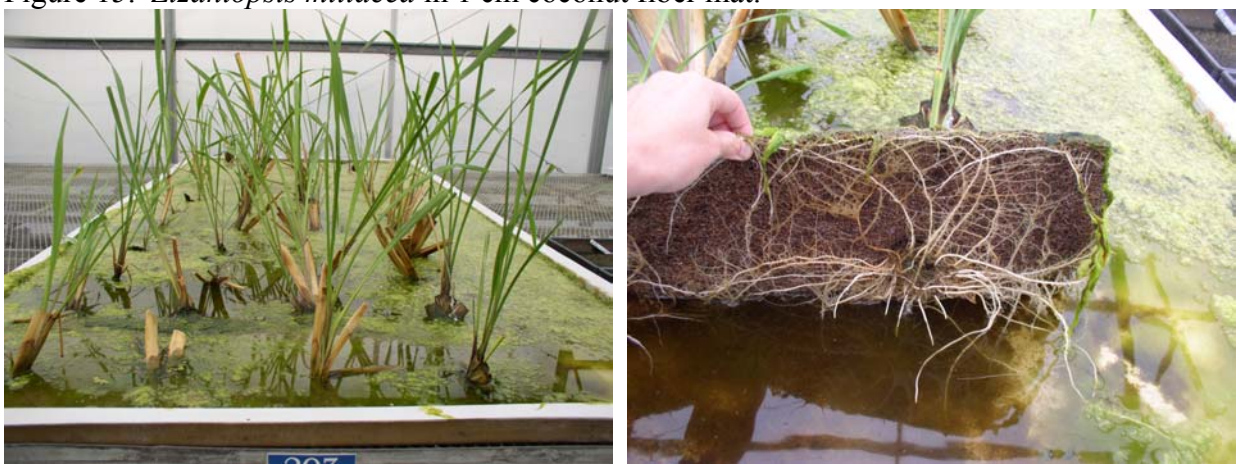


Figure 16. *Schoenoplectus californicus* in 1 cm coconut fiber mat

Figure 17. Installing *Schoenoplectus californicus* vegetated coconut fiber mat.

Figure 18. Installing *Zizaniopsis miliacea* vegetated coconut fiber mat.

Discussion

Establishing vegetative propagules whether by seed or vegetative means can be accomplished using wetland plant materials. Geotextile selection should be considered based on the anticipated use and the plant species desired according to specific site conditions. Though synthetic fiber materials were used in this trial, organic fiber materials that demonstrate longevity such as coconut fiber mats are the preferred materials in wild landscapes. The establishment of vegetative plant materials in biobased geotextile fiber mats is a viable option to stabilizing eroding shorelines. Success is based on proper plant selection and the degree of disturbance from wave energies. Further investigations should be considered to advance the potential use of biobased geotextile fiber mats for stabilizing eroding shorelines from moderate to high wave energies. Further study needs to be conducted on the use of biobased logs and tubes in association with wetland plant materials and vegetated biomats to address moderately to high energy eroding shorelines.