

Creation and Restoration of Coastal Plant Communities

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Chapter 7

LOW MARSHES, PENINSULAR FLORIDA

Roy R. Lewis, III

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I. INTRODUCTION

Previous chapters in this volume have dealt in detail with the restoration and creation of tidal marshes along the Atlantic coast (Knutson and Woodhouse), the western Gulf of Mexico (Webb), and the Northeast Gulf of Mexico including Florida (Kruczynski).

This chapter will not repeat any of that information except to refer the reader to those chapters and the general literature on southeastern U.S. tidal marshes.¹⁻⁶ This chapter will be limited to discussing the usefulness of the smooth cordgrass *Spartina alterniflora* Loisel in situations where it is not the dominant member of the coastal plant community.

II. THE NATURAL PLANT COMMUNITY

The southern half of Florida has, as its dominant coastal estuarine vegetation, mangrove forests composed of *Rhizophora mangle* L., *Avicennia germinans* (L.) Stearn, and *Laguncularia racemosa* (L.) Gaertn. f.⁷⁻⁸ A less conspicuous member of this community is smooth cordgrass (*S. alterniflora* Loisel.) which typically forms a band in front of the forest (Figure 1) in deeper water than can apparently be colonized by mangrove propagules. Davis⁹ has noted that "*Spartina alterniflora* grows best in the outer deep-water zone of swamps and may be effective in holding soil materials, thus aiding in establishment of a pioneer *Rhizophora* family". He also cites Fryberg¹⁰ as recognizing "that the mangrove plants contribute to the accretion processes, from the pioneer stage of *Spartina brasiliensis* on the offshore mud flats to the tall, close stands of red mangroves of the swamps".

III. THE ROLE OF SMOOTH CORDGRASS IN THE RESTORATION AND CREATION OF SOUTH FLORIDA COASTAL WETLANDS

The normal practice when attempting to restore or create a coastal wetland in South Florida has been to attempt to replant mangroves since they are the dominant "climax" community (see Chapter 8).

Attempts have been made, however, to utilize *S. alterniflora* in place of mangroves¹¹⁻¹⁶ for several reasons:

1. More rapid coverage and stabilization of substrates¹¹⁻¹⁶
2. Establish preferred nesting habitat for Clapper Rails (*Rallus longirostris*) and Willets (*Catoptrophorus semipalmatus*)¹⁶
4. More cost effective¹⁶
5. Greater value in erosion control¹⁵
6. Greater value in trapping sediments in street runoff¹⁴

In addition, as discussed in the mangrove chapter of this volume, *S. alterniflora* acts as a nurse species trapping floating propagules of mangroves and eventually being replaced by mangroves as they shade out the grasses.

Martyn¹⁷ in reporting on the foreshore vegetation of Georgetown, British Guiana noted: "The part played by *S. brasiliensis* in the primary colonization of the newly raised mud bank is of interest... the appearance of a grass in this role would appear to be unusual in the tropics, where muddy foreshores are more usually colonized directly by "mangrove"... once established, these plants of the mangrove association climax grow very quickly, becoming dominant to the *Spartina*, which finally almost entirely disappears beneath them."

Ranwell,¹⁸ in discussing successional processes in *S. anglica* marshes in Great Britain

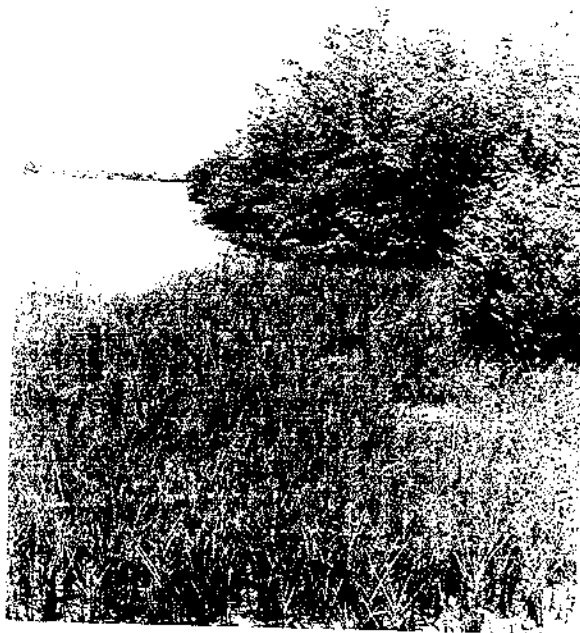


FIGURE 1. Typical view of a stand of smooth cordgrass (*Spartina alterniflora* Loisel.) situated in the lower intertidal zone in front of black mangroves (*Avicennia germinans* (L.) L. Tampa Bay, Fla.

comments on a similar shading out of *S. anglica*: "It was found that *Spartina* retained dominance for about 20 years, but in the subsequent 12 years, about 50 percent of the *Spartina* had been replaced by the invading species..." These invading species came in along the landward edge of the marsh and included *Agropyron pungens*, *Scirpus maritimus*, and *Phragmites communis*.

Spartina also lends itself well to wetlands creation where upland areas may be excavated to tidal elevations and planted for mitigation.¹⁹ Figures 2, 3 and 4 show the planting and growth of a 1.8 ha tidal marsh that was excavated from uplands and planted with 2127 plugs of *S. alterniflora* removed from an adjacent marsh. Mangroves, *Avicennia germinans* in particular have now begun invading the marsh.

Figure 5 shows aerial views of a man-made dredged material island in Tampa Bay, Fla., where natural colonization by *S. alterniflora* was observed.¹¹ Figures 6 and 7 show how the colonizing plants eventually spread and coalesced and are now being replaced by both *A. germinans* and *L. racemosa*.

S. alterniflora has been used specifically for its sediment binding qualities by planting it on dredged material in Florida.^{11-12,16} It has the advantage of stabilizing these shifting sand substrates much more quickly than planted mangroves and can do the job for 1/2 to 1/3 of the cost of mangrove tree transplanting.¹⁶

IV. NEEDED RESEARCH

Development of strains of *S. alterniflora* for their genetically superior abilities in rate of growth and eventually stand height and robustness are needed. Good seed sources are also needed since most seed harvested in Florida to date is either sterile or damaged by insects.

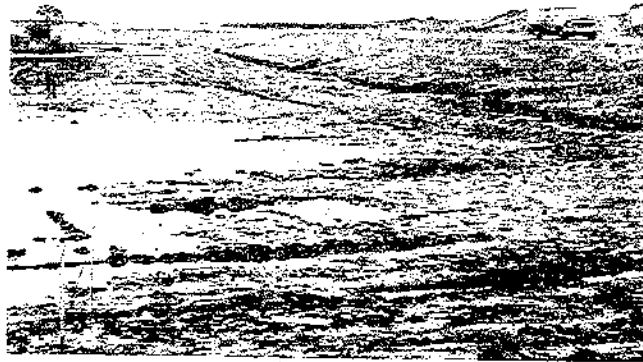


FIGURE 2. View of a 1.8 ha marsh creation site along Archie Creek, Tampa, Fla., April 1978.



FIGURE 3. Archie Creek marsh site, August 1978.



FIGURE 4. Archie Creek marsh site, April 1979.



FIGURE 5. Vertical aerial photographs of a dredged material island in Tampa Bay, Fla.



FIGURE 6. Ground level view of a dredged material island in Tampa Bay, Fla.



FIGURE 7. Ground level view of a dredged material island in Tampa Bay, Fla.

REFERENCES

1. Kurz, H. and Wagner, K., Tidal marshes of the Gulf and Atlantic coasts of northern Florida and Charleston, South Carolina, Florida State University, Tallahassee, Studies No. 24, 1957.
2. Adams, D. A., Factors influencing vascular plant zonation in North Carolina salt marshes, *Ecology*, 44, 445, 1963.
3. Eleuterius, L. N., The marshes of Mississippi, *Castanea*, 37, 153, 1972.
4. Eleuterius, L. N., The distribution of *Juncus roemerianus* in salt marshes of North America, *Chesapeake Sci.*, 17, 289, 1976.
5. Humm, H. J., III., The biological environment, a salt marshes, in *A Summary of Knowledge of the Eastern Gulf of Mexico*, Jones, J. I., Ring, R. E., Rinkel, M. O., and Smith, R. E., Eds., The State University System of Florida, Institute of Oceanography, St. Petersburg, 1973, III A-1.
6. Eleuterius, L. N. and McDaniel, S., The salt marsh flora of Mississippi, *Castanea*, 43, 86, 1978.
7. McNulty, J. K., Lindall, W. N., and Sykes, J. E., Cooperative Gulf of Mexico estuarine inventory and study, Florida: Phase 1, area description, NOAA Tech. Rep. NMFS Circ. 368, 1972.
8. Detweiler, T., Dunstan, F. M., Lewis, R. R., and Fehring, W. K., Patterns of secondary succession in a mangrove community, Tampa Bay, Florida, in *Proc. 2nd Annu. Conf. Restor. Coastal Vegetation Fla.*, May 17, 1975, Lewis, R. R., Ed., Hillsborough Community College, Tampa, Fla., 1976, 52.
9. Davis, J. H., The ecology and geologic role of mangroves in Florida. Paper from the Tortugas Lab., Vol. 32, *Carnegie Inst. Washington Publ.*, 517, 303, 1940.
10. Fryberg, B., Zerstörung und Sedimentation an der Mangrove-kunste Brasiliens, *Leopoldina*, 6, 69, 1930; as cited by Davis, 1940.
11. Lewis, R. R. and Dunstan, F. M., The possible role of *Spartina alterniflora* Loisel in establishment of mangroves in Florida, in *Proc. 2nd Annu. Conf. Restor. Coastal Vegetation Fla.*, May 17, 1975, Lewis, R. R., Ed., Hillsborough Community College, Tampa, Fla., 1976, 82.
12. Lewis, R. R. and Lewis, C. S., Tidal marsh creation on dredged material in Tampa Bay, Florida, in *Proc. 4th Annu. Conf. Restor. Coastal Vegetation Fla.*, May 14, 1977, Lewis, R. R. and Cole, D. P., Eds., Hillsborough Community College, Tampa, Fla., 1978, 45.
13. Banner, A., Revegetation and maturation of restored shoreline in the Indian River, Florida, in *Proc. 4th Annu. Conf. Restor. Coastal Vegetation Fla.*, May 14, 1977, Lewis, R. R. and Cole, D. P., Eds., Hillsborough Community College, Tampa, Fla., 1978, 13.
14. Fehring, W. K., Giovenco, C., and Hoffman, W., An analysis of three marsh-creation projects in Tampa Bay resulting from regulatory requirements for mitigation, in *Proc. 6th Annu. Conf. Wetlands Restor. Creation*, May 19, 1979, Cole, D. P., Ed., Hillsborough Community College, Tampa, Fla., 1980, 191.
15. Courser, W. K. and Lewis, R. R., The use of marine revegetation for erosion control on the Palm River, Tampa, Florida, in *Proc. 7th Annu. Conf. Restor. Creation Wetlands*, May 16-17, 1980, Cole, D. P., Ed., Hillsborough Community College, Tampa, Fla., 1981, 125.
16. Hoffman, W. E. and Rodgers, J. A., Cost-benefit aspects of coastal vegetation establishment in Tampa Bay, Florida, *Environ. Conserv.*, 8(1), 39, 1981.
17. Martyn, E. B., A note on the foreshore vegetation in the neighborhood of Georgetown, British Guiana, with special reference to *Spartina brasiliensis*, *J. Ecol.*, 22, 292, 1934.
18. Ranwell, D. S., *Ecology of Salt Marshes and Sand Dunes*, Chapman and Hall, London, 1972.
19. Lewis, R. R., Lewis, C. S., Fehring, W. K., and Rodgers, J. A., Coastal habitat mitigation in Tampa Bay, Florida, Swanson, G., Tech. Coord., *Proc. Mitigation Symp.*, July 16-20, 1979, Tech. Rep. RM-65, U.S. Department of Agriculture, Ft. Collins, Colo., 1979, 136.