



# Soil and Water Science Research Brief

University of Florida

Institute of Food and Agricultural Sciences

## SOIL CONDITIONS AND PLANT ESTABLISHMENT ON RECLAIMED PHOSPHATE-MINED UPLANDS

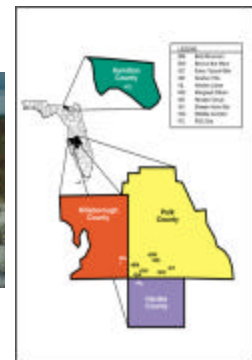
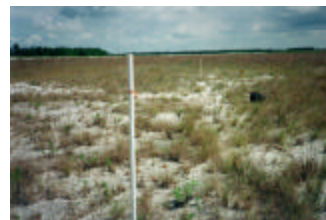
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Mining of phosphate in central and northern Florida has involved more than 66,800 ha (165,000 acres) of land, and a larger area is expected to be mined in the future. While much of this land was used for agricultural production prior to mining, and much will be reclaimed for that purpose after mining, there remains a need for development of techniques for reclaiming native upland communities.



Uplands have not received the same degree of legal protection as wetlands, but are now being recognized as vital ecosystems worthy of restoration. Reclamation of upland communities has been attempted by the phosphate industry, but unlike wetland reclamation, data on techniques and methodology for upland reclamation has not been compiled and synthesized. This study evaluates soil properties to determine which soil parameters influence successful reclamation of native upland taxa, as well as favor the growth and establishment of undesirable introduced aggressive grasses.

Ten sites were selected for this study based on the presence of native herbaceous species, lack of disturbance (such as cattle grazing or mowing), and known history of construction and planting methods, as well as to allow comparison of specific variables such as overburden *vs* sand tailings, topsoil augmentation *vs* no topsoil augmentation, and young sites *vs* older sites.



Soil parameters and vegetation community structure were evaluated on 9 to 24 transects (3 to 30 m length) at each site. Soil characteristics determined included pH, total C and N, CEC, available nutrients (Ca, Mg, K, P, Zn, Cu, Mn, Fe, and Na), and moisture index. The vegetation species were grouped into introduced aggressive grasses, wiregrass, lovegrasses, scrub species, and wetland species and the preferred soil conditions for these groups were evaluated. The relationship between the individual introduced aggressive grasses, cogon grass

(*Imperata cylindrica*), natalgrass (*Rhynchelytrum repens*), bahiagrass (*Paspalum notatum*), bermudagrass (*Cynodon dactylon*) and torpedograss (*Panicum repens*), and soil characteristics was also evaluated.

There are numerous complex factors and interactions causing variation in vegetation ground cover on the 10 sites. Introduction of native species and method of introduction were primary factors. Some general soil/plant relationships were noted, although soil characteristics were not the only critical factors for establishment of many of the vegetation types. Higher concentrations of soil nutrients and high pH promoted greater vegetative cover of introduced aggressive grasses. Therefore, amendments added to the soil to improve fertility may increase coverage of undesirable aggressive grasses, at the expense of slow-growing native species.



Areas with higher soil moisture retention such as low-lying pockets and overburden with high clay content near the surface may favor introduced aggressive grasses in communities where xeric species are targeted. However, high moisture retention capacity can favor native taxa indicative of mesic flatwoods or hydric flatwoods. Advancing the base knowledge for improving upland reclamation would require controlled experimentation to determine soil conditions best suitable for native taxa.

Full text of this paper can be found at: Nair, V.D. N.J. Bissett, K.M. Portier, D.A. Graetz, and D.S. Segal. 2000. Soil Conditions and Plant Establishment on Reclaimed Phosphate-Mined Uplands. p 35-48. In W.L. Daniels and S.G. Richardson. Proceedings, 2000 Annual Meeting of the American Society for Surface Mining and Reclamation, Tampa, FL, June 11-15, 2000. Amer. Soc. Surf. Mining Rec., 3134 Montavesta Rd., Lexington, KY.

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