

Role of Pathogens in the Brown Marsh Syndrome and Development of Direct Seeding Technology for Planting *Spartina alterniflora*

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Project Type: Experimental, Restoration

Project Outline:

Specific Aims

1. To determine the role of plant pathogens and their interactions with abiotic factors in the brown marsh syndrome affecting *Spartina alterniflora*
2. To determine the role of plant nutrients in the “stalled seedling phenomenon” as they related to direct seeding of *Spartina alterniflora*

Methodology

Traditional plant pathological approaches are used to investigate the roles of pathogens in brown marsh. Briefly, fungal isolations were made from roots and stems of field-collected plants, and a large collection of isolates was assembled. These fungi are being identified. Several inoculation procedures are being evaluated so that this collection can be assessed for pathogenicity and virulence. Once putative pathogens are identified, experiments will be conducted to determine if there are interactions with abiotic factors (salinity, pH, drought) related to causation of the brown marsh syndrome.

Seeds of *S. alterniflora* are stored submerged at 4C after harvest. They remain viable for up to a year. Seeds are planted into containers of flooded soil that have been amended with different levels of nitrogen (ammonium sulfate) and phosphorus. Plant dry weights are then recorded and tissues are analyzed for macro- and micro-nutrients. Additional replications are included that are planted with rice. The intention is to use rice as an indicator plant for soil nutritional status.

Results to Date

Several putative pathogens have been identified that cause typical stalk rotting symptoms as seen on such crop species as corn and sorghum. In particular, a species of *Fusarium*, as yet unidentified, not only causes typical stalk rot symptoms in *S. alterniflora*, but it also causes a newly described leaf disease (black leaf spot). This leaf disease is widespread in coastal Louisiana. The taxonomic status of this fungus is being assessed using DNA systematics.

While seedling growth still lags, once seedlings begin to grow, they exhibit a very strong response to added nutrients, and there is a definite ratio of N and P for optimum seedling growth and plant establishment. Growth and tissue concentrations in rice and *S. alterniflora* are being analyzed for correlative purposes.

Lessons Learned

These results are preliminary. However, we are particularly intrigued by the possibility that brown marsh may be caused, in part, by a typical stalk rotting pathogen, which is known to be affected in corn and sorghum by such abiotic factors as salinity and water stress.

We have not been able to overcome the stalled seedling syndrome, however, once seedlings begin to grow, there is a very clear and dramatic response to added nutrients. We must now investigate means by which nutrients can be added, e.g. slow release fertilizers, seed pelleting. In addition, we must investigate the use of growth regulators to stimulate rapid seed germination and early seedling growth.

Publications, reports, or web-accessible materials

Only abstracts to date.

Suggested citation: Georgia Coastal Research Council, 2004. Proceedings of the Marsh Dieback Workshop, held February 3-4, 2004, Savannah Georgia.