

# Development of *Spartina spartinae* Lines for Improved Seed Production and Viability for Restoration Along the Gulf Coast

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## Introduction

Factors limiting the widespread acceptance of gulf cordgrass (*Spartina spartinae*) as a conservation plant include: poor seed production; and having to rely on labor intensive and expensive asexual production to produce plants for re-vegetation projects. Having a dependable seed source would greatly increase the ability to establish more acreage at a lower cost.

Gulf Cordgrass (*Spartina spartinae*) (Trin.) Merr. ex Hitchc. is a native, perennial grass that grows in dense clumps along the Gulf Coast from Florida to Texas. Fig 1. Gulf cordgrass commonly grows in coastal marshes above the intertidal zone. More rarely, it can be found growing in saline soils associated with inland marshes and moist prairies.

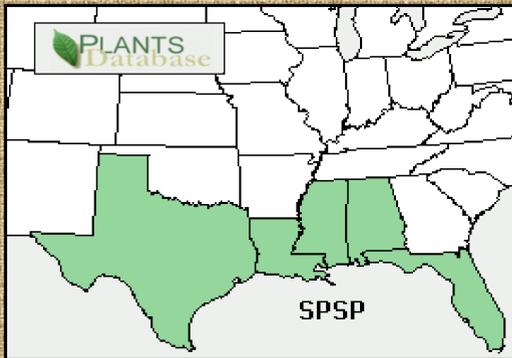


Fig 1. *Spartina spartinae* distribution.

## Objective

Study is to develop a dependable seed producing line using 65 collections from Texas and Louisiana. In 2000, 31 accessions identified with elite parentage based on environmental stresses and seed characteristics was planted in a randomized complete block design at the Golden Meadow Plant Materials Center in Galliano, Louisiana. Seed was collected from the 31 accessions from four replications in Oct/Nov, cleaned and stored seed at room temperature. Replicated germination test will be used to select potential parent materials that will produce the highest seed quantity and quality with improved germination.

## Materials and Methods

65 collections of *S. spartinae* were sampled from coastal southwest Louisiana to coastal southeast Texas. In 1985 these plants were transplanted in an observational nursery in Galliano, LA. 31 of the plants were chosen because of elite parentage and phenotypical appearances. 31 plants were then subdivided and placed in a randomized complete block design at the PMC, replicated 5 times. Plant spacing is approximately 6 feet and mechanical rotor tilling is the method performed to keep the plants isolated from one another. Herbicides are applied throughout the year for weed suppression. Annual prescribed burning is performed in the late winter of the year to remove decomposing vegetation and to promote new growth. *S. spartinae* is a perennial plant and grows vegetatively and produces seed throughout most of the year. Overall seed maturity was determined in November when the majority of seed began to shatter. Seed was collected by using bypass hand pruners to detach seed culms from individual plants. Seed culms from 4 of the 5 blocks were collected and placed into paper bags, then labeled by plot (block number) and accession number. Seed was hand stripped from seed culm and screened to separate seed from other debris. Seed was further cleaned using a South Dakota seed blower with a 1.5 cm opening setting and blown for 12 seconds using air for precision seed separation. Cleaned seed from each accession were stored in standard paper envelopes that were labeled for identity to distinguish respective plot and accession numbers.

Seed was stored at room temperature (70° +/- 5° F) in paper envelopes for 1 month. 50 seed per accession was then hand counted using a fluorescent light table. 50 seed per accession was then placed in standard size (100mm x 15mm) plastic Petri dishes lined with blotter paper. 4 replications of initial accessions collected in each of the 4 blocks were further plated. Seed was spaced in the dishes in a fashion that gave all the potential to germinate. Deionized water was used to irrigate the Petri dishes for moisture. The Petri dish lids were labeled by accession number, plot number and repetition number. Petri dishes were then placed at random in a Percival germination chamber. Chamber settings were 16 hours dark at 68° F and 8 hours light at 86° F. Germination was determined when radicle elongated from seed. Counts were made every 7, 14, 21 & 28 days and germination data was recorded. After the 28th day seed was placed in cold storage (38 -41° F) for 2 weeks to potentially break dormancy. Seed was then placed back into germination chambers and counts were again performed 7 (7C) and 14 (14C) days, respectively thereafter. This process was repeated 3, 6 and 12 months after harvest from field. Seed was stored at room temperature for the duration of the study's completion. Germination data was subjected to ANOVA and least significant difference test (P<0.05) to compare means.

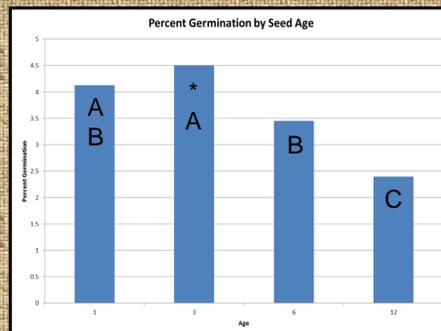


Fig 3. \* Means with same letters are not significantly different at 5% level of probability.

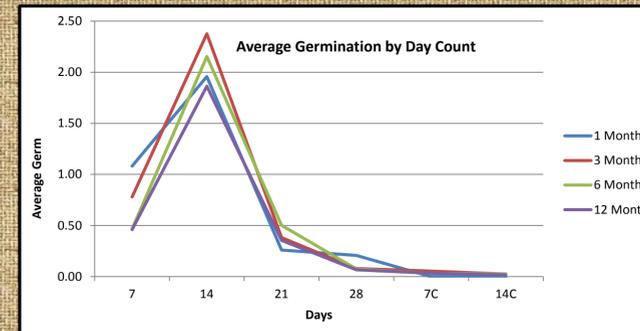


Fig 4. Average Germination by Day Count

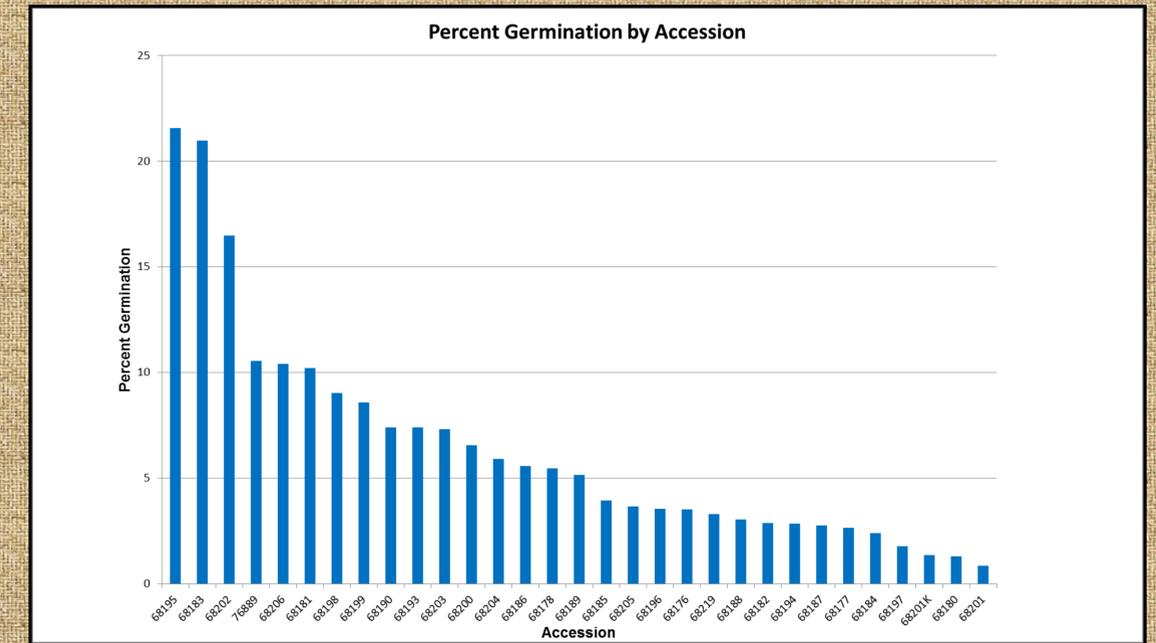


Fig 2. Percent Germination by Accession



## Results and Discussion

Figure 2 depicts a bar graph representing percent germination of *S. spartinae* by accession. Germination percentages for each accession were averaged for the 7, 14, 21, 28, 7C and 14C counts at the 1, 3, 6 and 12 month germination intervals. Significant differences LSD (P<0.05) in germination were detected amongst accessions. The highest percent germination was 54 % and occurred for accession 68195 at seed age = 3 months and day count = 14.

Figure 3 depicts a bar graph representing percent germination of *S. spartinae* by seed age. Germination percentages of all accessions were averaged at the 1, 3, 6 and 12 month germination intervals. As seed age increased after 3 months, overall germination trended downward. Significant differences LSD (P<0.05) of seed age were detected amongst the 1, 3, 6 and 12 month storage intervals. Seed stored at room temperature could have potentially been a function of seed germination.

Figure 4 depicts a line graph representing peak germination of *S. spartinae* across 1, 3, 6 & 12 month ages of seed. For all seed ages, peak germination occurred at the 14 day germination count.



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