

# Development of Stress Tolerant Seashore *Paspalum* for Golf Course Usage

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## **Goals:**

- Establish an extensive collection of genetic material.
- Improve the adaptability of the species with special emphasis on: acid soil stress tolerance with deep rooting and root plasticity in high bulk density (compacted) soil, winterhardiness to expand its adaptation zone, and wear resistance that will meet or surpass golf course requirements.

A 274-ecotype collection of *Paspalum vaginatum* Swartz has been assembled during the last three years. During 1994, collection trips were made to Hawaii (34 ecotypes), Sea Island, GA (133 ecotypes), Jekyll Island, GA (2 ecotypes), Fort Pulaski, GA near Savannah (30 ecotypes), and Tybee Island, GA (6 ecotypes). Four accessions from Brazil and two from Israel cleared quarantine. The oldest known native seashore paspalums located in the U.S., thus far, are those from Sea Island, GA. The golf course on the island was built in 1925 and the grass was already established at that time. Possible collection sites for 1995 may include coastal regions in Florida, Alabama, Mississippi, Louisiana, Texas and southern California.

By October 1994, more than 3,000 plots of seashore *Paspalum* had been planted in Georgia, with about 2,800 plots located in the Griffin area and 350 plots at Blairsville, in North Georgia. More than 2,200 tissue culture regenerated *Paspalum*s from six diverse ecotypes were planted in the field. We have collected data on a number of these somaclonal variants and will expose them to winter cold temperatures to assess, and hopefully select, improved winterhardy genotypes.

The winter hardiness (field survival) of seashore *Paspalum* is apparently much greater than what is published in the literature, at least for some ecotypes. ADALAYD supposedly is killed at 17° F, but some of our ADALAYD derivatives (EXCALIBRE, ADALAYD, FIDALAYEL), SIPV-2 (from Sea Island), and three accessions from Argentina (PI509018-1, PI509020, PI509022) survived -3° F at Blairsville during the 1993-1994 winter. In general, the finer-textured turf types survived better than the coarse-textured

types at both Griffin (+3° F) and Blairsville. An additional 124 ecotypes are being evaluated at Blairsville (1,500 feet elevation) during 1994-1995. Additional winter hardiness evaluation and improvement was initiated with calli and tissue culture regenerated plants using a cold chamber and modified bermudagrass cold shock-recovery protocol (Taliaferro, Oklahoma State).

Eighteen *Paspalum* ecotypes are being evaluated on a USGA-specification green. In 1994, the grass was mowed at a ½ inch during establishment (from sprigs) and will be maintained at 5/32 inches with a greens mower during 1995. Additional plots will be established during 1995 for herbicide management and fairway moisture utilization studies.

Several genetic analysis techniques have been employed on seashore *Paspalum*, including flow cytometry, random amplified polymorphic DNAs (RAPDs), restriction fragment length polymorphisms (RFLPs), and microsatellites. The techniques are useful in assessing the diversity or relatedness within the collection, in definitively fingerprinting ecotypes, and in genome mapping. Seashore *Paspalum* is a sexual diploid ( $2N = 20$ ), but sexual incompatibility reduces viable seed production to 5% or less with most ecotypes. Some ecotypes have photoperiod or cool temperature ( $\leq 60^{\circ}\text{F}$ ) requirements to initiate flowering. Several breeding techniques have been employed to enhance the production of viable seed.