Salt tolerant turf restores landscape

Salt-tolerant turfgrasses make it possible to produce high-quality turf on sites where maintenance may not otherwise be possible or economically feasible.

by MICHAEL DEPEW

About 2.5 billion acres world-wide are affected by salinity. Most are primarily located along coasts (including islands) and in arid and semi-arid regions.

Much of this marginal land and wasteland is only suitable for halophytic plant species—species with a set of ecological and physiological characteristics allowing growth and reproduction in a saline environment. Increased research and development on the selection and management of halophytic species for landscape use could lead to high quality vegetation of salt-affected land and/or the use of brackish or salt water.

The development of these turfs may be a significant contribution to the turf industry in areas with saline water.

Paspalum and dropseed

Two halophytic turf species are currently available for utilization. This includes three ecotypes of seashore paspalum *(Paspalum vaginatum)* and one ecotype of seashore dropseed (*Sporobolus virginicas)*. The seashore paspalum ecotypes include two fine-textured turfs (similar in texture to Tif 328) suitable for use on greens and tees and one medium-textured turf (similar in texture to Tif 419) suitable for use on fairways, roughs, and athletic fields. The seashore dropseed turf is a very fine turf suitable for use on close cut fairways and athletic fields. Other halophytic turfgrasses are currently under development including salt grass *(Distichlis spicata)* with increased salinity tolerance (up to 60,000 ppm) and cold tolerance. High salinity tolerance and cold-tolerant warm-season turf is particularly important in climates which have high seasonal temperatures, poor quality water and periodic cold events.

"The key to the development of these turfs has been the utilization of a multiple high stress environment", says Stewart Bennett, CGCS of Environmental Turf Solutions, Pineland, Fla.

"The multiple high stress environment includes the use of low mow heights, high salinity irrigation and high traffic stress."

The seashore paspalum ecotypes were developed utilizing brackish irrigation up to 15,000 ppm and in an environment receiving periodic flooding from salt water tidal surges. This results in a very high attrition rate of turf. The benefit is a remaining turf that can withstand these types of real-life stresses.

The seashore dropseed ecotype was developed under a similar high stress environment. An initial selection of a native forage cultivar from a Caribbean island formed the basis for the development of a turf.

"The seashore dropseed was collected off a beach that was frequently grazed by goats" says Paul Tillman, another member of the ETS research team.

"This turf was not irrigated except for incoming tides. We placed the turf under close clipped conditions at about ½-inch, using salt water for irrigation. The turf struggled and most of it died initially under close mowing but once the remaining turf adapted to the high stress environment, the resulting turf was very fine textured and of high quality. From our development nursery we placed test areas on golf courses to see how well it stood up to traffic. The turf performed beautifully forming a very dense and stiff turf. Some of the test areas went for several weeks without irrigation of any kind and yet the

An application of table salt is made to the target weed species on a putting green. This is done by first wetting the area with a mist of water from a spray bottle. The wet leaf retains the salt, and thorough burning of the plant tissue is achieved. In full sun, extensive plant burning is observed in a matter of a couple of hours.

The following day, the weed species is completely burned leaving only the seashore paspalum turf. Don't try this on bermudagrass greens folks!

After one week the turf has already filled in two to three inches around the margin and is spreading throughout the center of the treated area.

turf still was green and of an acceptable quality. We are very excited about this turf for use in the Caribbean and similar areas. Some of the islands have no freshwater resources except for expensive desalinized water. A golf course in the Virgin Islands, for example, has expenditures for desalinizing irrigation water in excess of $3 million dollars per year."

There has to be a lot of rounds of golf on a course like that just to break even financially. The use of seawater, either straight or diluted with limited fresh water can result in considerable savings in many areas of the world.

The development and use of these turfs is not without challenges. Each has its own unique set of management and maintenance requirements.

"For example, when we placed the seashore paspalum turf onto a Florida golf course for trial we encountered weed encroachment that we did not experience in the nursery," says Tillman. "This presents a unique situation in that labeled herbicides are limited, especially for grassy weeds. The problem was not an inherent weakness in the turf but rather a situation in which the salinity of the irrigation water was too low for optimal growth and development of the seashore paspalum. The irrigation water was already being diluted with culinary water so that the course could grow bermudagrass. A simple adjustment in the dilution ratio increased the salinity of the water and the seashore paspalum thrived. To speed the removal of weed invaders we experimented with the application of straight granular sodium chloride table salt to the plants. In the weedy areas in which only about 10 percent seashore paspalum was present, we had about 90 percent fill-in three weeks after the salt treatment."

Halophytic turfgrass has a unique and specialized role in the industry. While not needed in areas without salinity or severe water quality issues, the development of these turfs fills a niche in the industry. Halophytic turfgrass makes it possible to produce high quality turf on sites in which the maintenance of turf may not be possible or economically feasible. **LM**

—The author and Stewart Bennett and Paul Tillman make up the technical team of Environmental Turf Solutions, Pineland, FL, which markets and distributes halophytic turfs.

Marketing the halophytics

Private research and development efforts have led to the availability of high quality turf species suitable for use in general landscapes, sports turf and golf courses. The three principals of Environmental Turf Solutions (ETS) headquartered in Pineland, Fla., have been working with the development of halophytic turfgrasses for the past seven years. With the successful development of high quality turf species, ETS was formed in 1997 to facilitate the marketing and distribution of these halophytic turfs. The ETS technical team consists of Paul Tillman, Michael DePew and Stewart Bennett. Paul holds a degree in engineering and a masters degree in turf agronomy. Michael holds bachelor degrees in turfgrass science and soil science and masters degrees in soil science and agronomy. Stewart is a certified golf course superintendent and holds an A.S. degree in golf course operations.

For more information, ETS can be contacted via e-mail through their web site at www.etsturf.com.