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to effectively manage the saline irrigation water and potential salt loading in the site-specific soils. No, you cannot grow-in this grass with high salinity water unless you want a long grow-in period and want to spend extra money on grow-in management. Salt is a growth regulator even on seashore paspalum.

Yes, you can potentially conserve water (30-50 percent) with this grass compared to the hybrid bermudagrasses, but it depends on salt load in the irrigation water, the site-specific environmental (i.e., rainfall distribution and frequency) conditions, the efficiency of the irrigation system, and how much leaching of excess salts must be accomplished. Proper management is the key.

#### Salt Removal?

Seashore paspalum is a phytoaccumulator of heavy metals and nutrients, but not high levels of salt compared to total salinity concentrations normally found in soils. The entire root and shoot portion of the turf will hold about 9-17 percent salt (mainly sodium) on a dry-weight basis.

The grass very strictly regulates uptake of sodium and eventual movement/ compartmentalization of that sodium at sufficiency levels internally in the plant. If all clippings and total plant material (roots and shoots) are removed from all turf areas, the total salt ion removal with harvested tissue would range from 553-3488 lbs/acre/yr, which is minimal compared to the total salt load in soils.

#### Attributes of the Grass

Compared with other turfgrasses, seashore paspalum has a wide soil pH adaptability range across ecotypes (3.6-10.0), depending on ecotype/cultivar, but management under precision turf conditions is still recommended between pH 5.5-8.0 to optimize turf performance because of soil-related and nutritional problems at each extreme pH.

Most alternative and variable quality irrigation water sources can be used for irrigation. The grass is primarily rhizomatous and secondarily stoloniferous, with an inherent capability to develop about twice the root volume of the hybrid bermudagrasses when managed properly. When the grass is injured from excess traffic or disease/insect infestation, seashore paspalum shifts into a rhizome/root regeneration mode, with carbohydrates allocated to below-ground turf organs and minimal carbohydrate maintenance of the shoot portion.

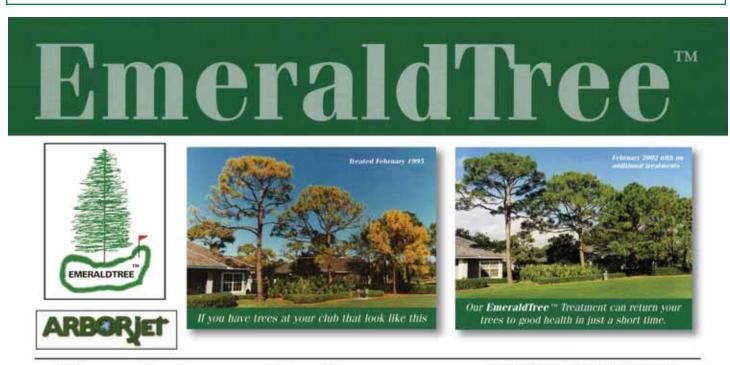
The grass has low mowing height tolerance (1/10-inch to 1/8-inch range, depending on cultivar). The efficient nutrient uptake and utilization system has been mentioned. There is no "genetically inherited grain" in the greens. Seed heads may be produced but the probability of viable seed being produced is extremely low because of extremely precise temperature and genetic requirements needed for seed set.

There is virtually no or minimal morning dew on the grass due to the high wax load on the leaves (the hybrid bermudagrasses have numerous small hairs that will hold water droplets). The grass has a shiny dark green hue similar to Kentucky bluegrass or perennial ryegrass.

Seashore paspalum has the capability to root into most soil types, ranging from sands, expanding and non-expanding clays, to silt, to mucks/swamps. At this point, no verified mutations (compared with the hybrid bermudagrasses) have occurred with this species. The genome apparently is very stable compared with other warm-season grasses.

#### Limitations of the Grass

There are always positives and negatives with any grass. Seashore paspalum is no exception. As with any other turf species, it is important to know the specific attributes inherent in each individual cultivar,



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rather than generalized attributes of the grass based on where it may have originated. Significant variations occur across cultivars for salinity tolerance, traffic tolerance, low light intensity tolerance, mowing height response characteristics, and other traits. Thus, one area of confusion is the tendency to claim attributes for a cultivar that has not been documented by scientific-based research data followed by multiple oncourse evaluations and involving several years.

The grass has minimal tree shade tolerance, similar to the hybrid bermudagrasses. The rule of thumb is that if you have tree-shade problems with bermudagrass, then you will have tree-shade problems with seashore paspalum. The primary problem is the excessive tree shade, and not the turf species (zoysiagrass or St. Augustinegrass are usually better turf choices under heavy tree shade).

However, seashore paspalum does a better job of utilizing ultraviolet wavelengths coming through cloud cover, smog, or fog compared to the hybrid bermudagrasses with SeaIsle1 exhibiting the best low-light-intensity tolerance found in research studies to date. Seashore paspalum seems to utilize deflected or reflected light better than the hybrid bermudagrasses.

Cold hardiness is similar to the hybrid

bermudagrasses. The grass cannot be established with highly saline water (greater than 5000 ppm total dissolved salts; recommended salinity load for grow-in is less than 2000 ppm) without delaying grow-in for any of the currently marketed cultivars. Seed head persistence as a cosmetic problem varies by cultivar, but plant growth regulators are available to suppress seed heads when warranted. There are very few pesticide labels that include seashore paspalum, but this problem is slowly improving.

The grass absolutely should not be scalped. The authors have noted one university publication that states that seashore paspalum does not mow cleanly - early research at the University of Georgia documented that 'Adalayd' and some of its derivatives were difficult to mow properly, but the improved university-researched cultivars do not have this problem. Overall worm complex (fall armyworm, sod webworm, grubs) resistance is, at best, low to medium low compared with bermudagrasses and this insect response goes across all paspalum cultivars on the market. The number-one problem with the grass is the lack of understanding on how to effectively manage this turfgrass and how to continuously manage the salt load in the irrigation water.

#### Infrastructure Improvements for Effective Salt Management

As water quality decreases and salinity challenges increase, spending money on golf course infrastructure can effectively reduce long-term maintenance budgets and improve grass management that will be easier to reach the performance expectation levels for the grass on the golf course. The best money can be spent on the irrigation system to enhance water distribution efficiency, either as a retrofit or upgrade, or installation of a more modern system. This is the best water conservation decision that any golf course can make - being able to apply the water exactly where it is need, when it is needed, and at the quantity needed to efficiently manage the salts in the water and the soil.

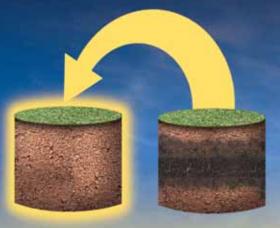
Install drainage, especially in low fairway areas and on the low edges of greens to effectively pull salts away from the turf root system. Utilize soil profiles that are conducive to salt and water movement (continuous infiltration/percolation at effective rates); for example, utilizing sands in the greens that range between 0.25-1.00 mm, with less than 10-15 percent total combined clays, silt, fine sands and organic matter (peat), and percolation rates greater than 10 in./hr. Utilize irrigation water as low in salinity

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SeaDwarf, which was used on the Crown Colony Golf Club shown here, is another of the popular paspalum cultivars being used on golf courses. Photo by Joel Jackson.

as possible, depending on the various sources that can be blended. Install chemigation equipment on the irrigation system to have the flexibility to apply liquid fertilizers, amendments such as flowable lime or gypsum, wetting agents, or other chemicals.

Install moisture- and salinity-monitoring equipment on the course to improve salinity and water-use management. On coastal sites, get a geohydrology assessment completed to determine tidal influences on subsurface soil profile (i.e., acid sulfate conditions) and salt water inundation potential into on-site water resources.

#### Availability of Cultivars

Since cultivars are not created equal, selection of golf course friendly cultivars can be a critical decision. Two cultivars from the University of Georgia USA – Seaisle1 (www.seaisle1.com) for fairways, tees, roughs and occasionally for greens, and Seaisle 2000 (www.seaisle2000.com) for greens and now being grassed on entire golf courses are available. Seaisle1 and 2000 are the only patented, certified, and university-researched seashore paspalum cultivars available globally. Extensive research on these two cultivars has been published and is available from the authors.

At the present time, there are 17 total seashore paspalum cultivars available in the world. A new cultivar – experimental SI98 or OC03 (formal name is pending) was released from the University of Georgia in November 2004 and should be available for grassing late this year. This new cultivar is suitable for course-wide planting from greens to roughs. Other proprietary cultivars available for grassing in Florida include Seadwarf and Salam.

Seashore Paspalum Playability Factors Several factors are contributing to the acceptance of seashore paspalum for use on golf courses. The high salinity tolerance and flexibility in using alternative poor quality irrigation water, the cosmetic appearance resembling Kentucky bluegrass, the tournament-quality playability putting quality under close mowing heights and the ball "set up," and the environmental attributes are all contributing to this acceptance.

The positive playability factors include ball set up, color — shiny dark green hue, ball striking control, no "grain" in the greens, density of putting surface, and trueness of ball roll.

The negative playability factors include a "sticky" surface, slow greens, greens that are difficult to read, bumpiness or "chatter" in the ball roll, and the trueness of ball roll: all of these negative complaints are directly attributable to the overall management program and understanding how to effectively manage the grass under greens heights.

AUTHORS' NOTE: The authors invite questions on comprehensive and correct management protocols, assessing the salinity impact on your golf course, and long-term performance of the grass. A comprehensive list of published seashore paspalum articles can be sent via email attachment if requested. The contact information for all authors is listed on the inside front cover. At Florida Green presstime, two articles by Drs. Duncan and Carrow were scheduled to be published in **Golf Course Management** regarding comprehensive greens management details for seashore paspalum).

EDITOR'S NOTE: We are not promoting this turf variety over any others, but there may be growing sentiment for using this grass among regulatory agencies, and we want you to know as much as possible about the pros and cons of these new turf varieties.

## References

Copyrighted Workbook for GCSAA-sponsored 1-day workshop: Seashore paspalum management on golf courses (taught by the author) Copyrighted Workbook for GCSAA-sponsored 2-day workshop: Salt-affected turfgrass sites: assessment and management (co-taught by the author)

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# SeaIsle1 Keeps Your Irrigation Options Open



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Option B Recycled Water, Gray Water and Effluent Water Sources

Recycled water usually varies by location, season, quality and nutrient content. Depending on the uniformity of your source, you may need to monitor water quality daily, weekly or monthly. SeaIsle will do quite well with up to 4, 5, even 8 thousand TDS.

Option C Use Blended OceanWater with Aggressive Management

Fresh water is a must during the grow-in phase, but mature turf can be irrigated with ocean water/fresh water blends. This requires a comprehensive aeration and leaching program to move excess salts downward through the soil profile.

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#### INDUSTRY NEWS

# Spring Growth is in **FullGear**

By Todd Lowe

Bermudagrass growth has sprung into action throughout the Florida Region. The rains that occurred over the past few months flushed salts from the rootzone and, with the recent increase in soil temperatures, bermudagrass growth has increased significantly. The increased growth provides a welcomed improvement on tees, fairways, and roughs that became beaten down over the winter season from continual play. These areas are now actively growing and recovering from stress.

Putting greens have become slower and less consistent with the recent growth flush. Surface grooming, brushing, light verticutting

and sand topdressing can be implemented on a more frequent basis to improve playing conditions on putting greens at this time.

Also, plant growth regulators can be applied to curb bermudagrass growth and improve overall turf quality. These chemicals suppress a growth hormone within the grass, decreasing vertical growth and encouraging turf density. On putting greens, PGRs improve turf density and consistency when applied on a continual basis.



Todd Lowe

PGRs are also applied to fairways from late spring through the fall to reduce clipping production, thereby reducing mowing frequency and clip-

from Clemson

University also reveals

improves turf quality on

shaded bermudagrass

putting greens as well.

that the PGR Primo

(trinexapac-ethyl)

ping removal.

Golf courses that overseeded this past

winter are experiencing a slower transition back to the bermudagrass base. Cool spring temperatures favored overseeding growth over bermudagrass and this may encourage additional turf thinning when the overseeding finally dies off.

Smoother transitions generally occur when cultural practices are implemented throughout late winter and spring. Such practices include frequent grooming, brushing or light verticutting in winter, when the overseed is healthy. Then, as temperatures increase in spring, mowing heights should be lowered to increase sunlight penetration to the base bermudagrass. When temperatures warm substantially and sustained bermudagrass growth occurs, the turf should be fertilized more frequently with readily-available nitrogen to encourage bermudagrass recovery.

Some clubs are experimenting with herbicides to remove the overseeding and encourage bermudagrass recovery. These chemicals are effective, and can completely remove the overseeding in a few weeks. So, it is important to apply them during periods of active bermudagrass recovery and to communicate the possibility of unsightliness to the membership.

**The Florida Nursery Growers and Lawn Care** Association has announced the 2005 Plants of the Year. The plants selected for this program have been found to be good performers in the Florida environment and require less maintenance and fewer inputs. Here are two specimens for your consideration.



Plants of the Year

Nun's Orchid

Common name: Nun's Orchid Botanical name: Phaius tankervilliae Hardiness: Zones 8-11 Mature height and spread: 3 ft. x 1.5 ft. Classification: Orchid-ground cover Landscape use: Perennial for mass use or as specimen in part shade. It is also good used as a potted plant

Characteristics: Sword-shaped leaves develop as the tall inflorescence of white, rose and brown flowers reaches full bloom in the late spring. The Nun's Orchid goes dormant in North Florida.



'Mona Lavender" Plectranthus

Common name: 'Mona Lavender' Plectranthus Botanical name: Plectranthus 'Mona Lavender' Hardiness: Zones 9-11

Mature height and spread: 2 ft. x 2 ft. Classification: Perennial, annual in North Florida Landscape use: Massed for color in a low border in full sun to part shade

Characteristics: The 'Mona Lavender' is compact, everblooming with handsome purple-backed leaves and produces multitudes of short stalks of lavender flowers.

Recent research

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- Calcium causes the release of the sodium to soil bond reducing salt content of soils.

Calcium plays a large part in the respiratory and cell wall development of the plant. With soil temperatures on ultra dwarfs rising as high as they do, the plant will use large amounts of calcium from the soil. *Mega Cal II* will go directly into soil solutions making it readily available to the plant, keeping the plant healthy from disease and heat stress.



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## Florida Legislature Makes Water-Quality BMPs Mandatory

With only one abstaining vote, the Florida House and Senate overwhelmingly approved Senate Bill 444 which calls for "Best Management Practice Mandatory Use and Enforcement" with regard to protecting "Total Maximum Daily Loading (TMDL) by Non Point Source Pollution."

In an effort to put some teeth into the 1999 Water Restoration Act, the Legislature gave the Department of Environmental Protection a law which will require all entities located within a particular watershed to abide by BMPs to reduce their input of potential pollutants to bodies of water that have been deemed to be impaired or of low quality.

This law applies to all sectors of society and is not specific to the golf-course industry. Everyone who lives or operates within a designated watershed is affected, including residents, businesses, industries and municipalities.

Based on Basin Management Plans, the DEP will adopt by rule BMPs that, when practiced, will ideally help all sectors reduce their inputs that affect water quality. These BMPs will be mandatory and will be enforced by DEP, counties and/or water management districts depending on the locale and resources available.

The FGCSA voluntarily began to write a revision to existing golf turf management BMPs that was based on a 1991 manual produced by IFAS. This process had advanced to the stage where regulators and environmental groups were given a draft copy to read, discuss, edit and approve. Just as this process was beginning, the legislature passed SB444, making the BMPs no longer a voluntary program, but rather a mandatory process for protecting the state's water quality.

In the photo below is just a handful of BMP type manuals dealing with springs protection, agricultural chemical handling and storage, silviculture (forestry), green industries (primarily lawn care) and the old IFAS manual for BMPs which was focused on growing turfgrass primarily and not necessarily on environmental impacts. There are other BMP manuals out there for



Some of the Best Management Practice manuals written when BMPs were voluntary. Photo by Joel Jackson

Indian River citrus growers, dairy cattlemen and poultry farmers. All of these were done on a voluntary basis and several have been adopted by rule. Some of them may have to be revised to comply with the intent and requirements of future basin management plans written under the authority of SB444.

With that in mind, each subcommittee on the Golf BMP Steering Committee — an ad hoc group of scientists, regulators, educators and superintendents — is reviewing its section (siting, design & construction; irrigation; pest control; nutrients; cultural practices; maintenance facilities and wildlife habitat management), to identify and highlight practices that will affect water quality. Ideally from this list of BMPs that are practical, technically and economically feasible, and obtainable by all golf courses, a checklist will be developed that each course can complete to be in compliance.

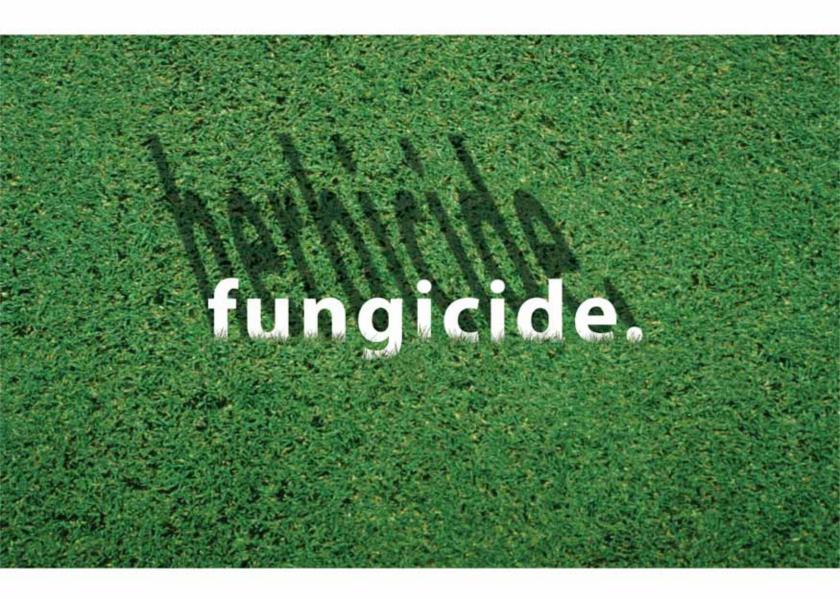
Once the BMPs have been adopted by rule and a facility is following them, it will be deemed to be in compliance and have protection under the law. If the BMPs do not prove to reduce non-point source pollution target goals for your facility, then the BMPs will be revised, but the facility will not be held responsible since it was following the recognized best management practices. This assumes that the facility can demonstrate and document adherence to the BMPs.

For a complete copy of Senate Bill 444, log on to www.gcsaa.org and go to the Government Relations section and then to the Advocacy Resources, then click on Bill Tracking, and then on the link titled Search for Current State Bills. Then scroll down to Florida and click on SB444.

This law, like all well-intended statutes, tries to get everyone living and operating in a watershed or basin to act responsibly with regard to environmental impacts from their daily routines. The people who are already responsible may learn some new ways to lessen their impacts, but those who don't care will continue to take short cuts. My concern is that regulators will once again focus on the most visible entities (business, industry and golf courses) and the general public will continue to avoid scrutiny. Businesses will jump through more costly hoops, and the largest, most ill-equipped and poorly trained sector, the homeowner, will continue to pollute at will or out of ignorance.

Joel Jackson





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# Road Trip

#### Three days in Naples were not nearly enough to see all that we would have liked to see

In the past I have had many opportuni-

ties to travel the state, giving talks and checking out

environmental projects on golf courses. I call those

days BT (before Thomas). I just never realized how

much I missed getting out and about until my recent

road trip to Naples. I received two phone calls about

coming over and doing Audubon recertification site

visits to Royal Poinciana and Foxfire. What fol-

lowed those phone calls were three of the most

By Shelly Foy

enjoyable days I have had in a long time.

Todd Lowe and I are both Audubon Stewards, so I called Todd and asked him if he would like to meet me for both site visits and a few stop-by's. Todd, the ever agreeable person that he is, said "Sure, just tell me when."

#### Foxfire Country Club, Naples

Superintendent Jon Vingson, General Manager Brian Heidel, and Audubon Coordinator Harold Dowell took us on a tour of the golf course. Foxfire has been a member of the Audubon Cooperative Sanctuary Program since 1993 and fully certified since 1998. The members have a group called the "Nature Group," headed by Dowell, and they host several fundraisers each year to help support their Audubon-related projects. Their motto: "Just nice folks having fun – nature's way – at Foxfire!" These are definitely my kind of people!

Foxfire leadership takes its ACSP very seriously and everyone works hard at maintaining the environmental integrity of the property. The club has some exciting projects under way, and in particular I am sure the members are looking forward to the new clubhouse that was under construction at the time of our visit. The highlight for me, however, was the bald eagle that swooped down over the lake, picked up a fish, flew right over our heads and landed in a nearby tree to have lunch! I'm still not quite sure how they arranged for the eagle to perform on



A serious amount of wildlife can get though this corridor! I know it looks small in this picture, but my guess would be that it is about 20 ft. wide. Photo by Shelly Foy.