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Looking at large patch in seashore paspalum

Academics test fungicides on various paspalum cultivars to combat disease.

Seashore paspalum (*Paspalum vaginatum O. Swartz*), described as the environmentally friendly grass, is among the most salt- and sodium-tolerant turfgrass species. This halophytic, perennial warm-season grass, which undergoes winter dormancy in colder climates, produces a beautiful turfgrass surface during its growing season. It's used mainly in mild to warm climates when the soil salinity and sodicity are high, when drainage is a problem and the water quality is poor. It can be used as a turfgrass for lawns, athletic fields and golf courses but also to control erosion and stabilize dunes and coasts.

Typically, it's propagated vegetatively (by sod or sprigs). The species doesn't produce a large amount of viable seeds, and seed production generally isn't reliable. However, there's a new cultivar, Sea Spray, which is established by seeds. Seashore paspalum produces a dense and high-quality turf. It has excellent drought resistance and dehydration avoidance, is fairly competitive against weeds and requires less nitrogen than other warm-season grasses.

Some authors consider seashore paspalum to be native to Asia, Africa and Europe and introduced to the Americas. Other botanists believe it originated in America and naturalized into the old world. Even though the true origin isn't clear, recent studies about gene diversity and genetic distance between populations from different regions support the theory that seashore paspalum was introduced to North and South America from South Africa. The diversity among the ecotypes from South Africa is the largest, while accessions from North America and South America are highly similar.

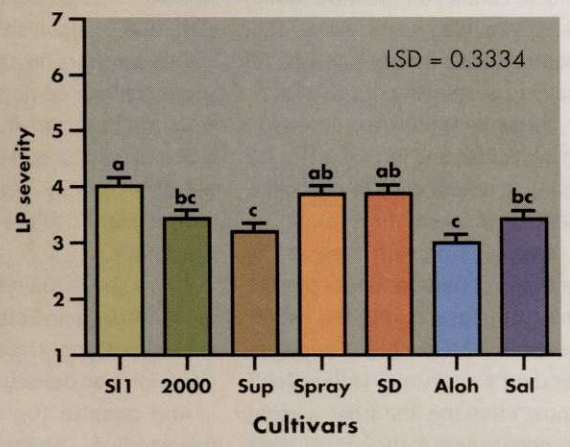
INTRODUCTION TO THE U.S.

The wild, fine-leaf textured ecotypes of seashore paspalum found along the coast of the Atlantic Ocean, primary throughout coastal South Carolina and Georgia, are believed to have been introduced from Africa with the slave ships. The grass was used as a bed on the bottom of the ships that arrived to America during 1700s and 1800s.

During 1950s, O.J. Noer propagated an ecotype he found from fairway 13 at the Sea Island Golf Club in Georgia and distributed it to several people interested in this grass, including some in Hawaii. Australian cultivars Futurf and Adalyd were introduced into California during the 1970s. Although some research was con-

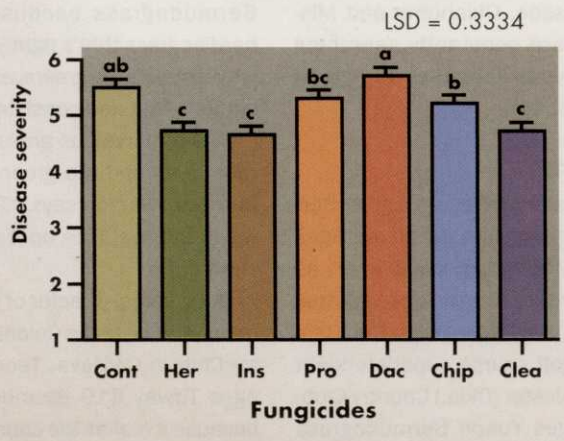
Large patch cultivar susceptibility MRGC

1=bad, 9=best
November 2005 to March 2006



Large patch fungicide control PDREC

1=bad, 9=best
November 2005 to March 2006



Symptoms of large patch on seashore paspalum fairways in South Carolina in December 2005. Photo: Alejandro Canegallo and Bruce Martin

ducted in California during the 1980s, the first formal breeding program for seashore pasplaum was initiated at The University of Georgia by R.R. Duncan, Ph.D. in 1993.

CULTIVARS

All the cultivars being used as turfgrass are considered ecotypes, which means strains or selections within a given species adapted to a particular environment. Several collections of seashore paspalum have been assembled in Argentina with 28 Argentine-native ecotypes and in the U.S., first at the University of Florida Fort Lauderdale Agricultural Center and later between 1993 and 1999 at the University of Georgia, Griffin. Ecotypes from Rhodesia (now Zimbabwe), Mozambique, South Africa, Argentina, Hawaii, Australia, Guam, Brazil, Thailand, Israel, Uruguay, as well as Georgia, North Carolina, South Carolina, Florida, Texas, Arizona, California and Louisiana, have been assembled in the Georgia collection.

DISEASES

Seashore paspalum exhibits little disease incidence in its naturalized habitat; however, under the high maintenance programs on modern golf courses, several diseases have been found to cause severe damage under typical management and environmental regimes. Because seashore paspalum is a relatively new grass species for Southeastern U.S. golf courses, research information related to the occurrence and control of diseases on this grass is limited but is needed as interest in seashore paspalum increases in the Carolinas.

We've documented several diseases, including large patch (caused by *Rhizoctonia solani* AG 2-2 'LP'), dollar spot (severe on several cultivars) and a necrotic superficial fairy ring. Also, we've isolated *R. zeae* from seashore paspalum and suspect it's pathogenic, similar to its ability to cause disease in several cool- and warm-season turfgrasses. In this article, we will only discuss the description of large patch symptoms, identification of the causal agent, cultivar susceptibility to the disease and curative effects of fungicides on large patch.

Large patch has been diagnosed on seashore paspalum in South Carolina and from several sites in Florida (Martin, unpublished). Symptoms typical of large patch were observed, which included more or less circular patches of yellow-brown turf from 17 inches as big as 10 feet or greater. Diseased grass shoots at the margins of patches were yellow, and lesions could be observed that originated near the attachment of shoots to stolons.

Samples were collected from solid, large brown patches as big as several meters in diameter from a putting green at Old Collier Golf Club, Naples, Fla., in February, 2005 (cultivar Sea Isle Supreme), from a practice putting green (cultivar Sea Isle 2000) at May River Golf Club in Bluffton, S.C., on March 31, 2005, and from a tee box at The Ocean Course on Kiawah Island, S.C., on May 9, 2005, (cultivar Sea Isle 1). Lesions on the basal leaf sheaths were observed under the stereo microscope at 70 X magnification and symptomatic leaves were easily pulled off from the plant and observed under a compound microscope. The mycelium observed at the base of the leaves was identified as a *Rhizoctonia* species based on hyphal characteristics: 90-degree hyphal branching, dolipore septa, septa near the side hyphal branches, and hyphal diameter about 10 micrometers.

Using standard isolation techniques, *Rhizoctonia* was easily isolated and purified in culture for further identification. Cultural characteristics of mature cultures turned brown and had abundant aerial mycelium with little to no sclerotia formation in culture. Nuclei in cells were stained with a fluorescent dye, called DAPI, that binds to DNA clearly showing a multi-

nucleate condition. The above characteristics placed the fungus into the species *Rhizoctonia solani*, and cultures were consistent with other isolates from large patch identified from other turfgrasses.

Three isolates of *Rhizoctonia solani* from seashore paspalum were paired with a tester isolate of *R. solani* AG 2-2 LP isolated from *Zoysia* spp. This isolate previously was used as a tester in a separate study. This pairing is called anastomosis testing and can be used to determine affinity of strains of *R. solani*. In our experiments, the strains from seashore paspalum fused with a tester from zoysia and clearly placed the fungus into *R. solani* AG 2-2 LP. Further inoculations onto seashore paspalum reproduced the symptoms of large patch, and the fungus was reisolated and shown to be identical to the inoculated fungus. This proved pathogenicity and showed the causal agent to be *R. solani* AG 2-2 LP and the disease on seashore paspalum to be large patch. This is the first formal report of large patch on seashore paspalum.

TESTING FUNGICIDES

An experimental putting green was built at the Pee Dee Research and Education Center in July 2005. The green was constructed following USGA specifications for putting greens. Seven cultivars of seashore paspalum (Sea Isle 1, Sea Isle 2000, Sea Isle Supreme, Sea Spray, Sea Dwarf, Aloha, and Salam) were planted in a randomized complete block design with three replications. The plots were 12 feet by 21 feet.

A natural and severe epidemic of large patch occurred during late September and early October 2005. So, every cultivar main plot on the green was divided into seven subplots, 3 feet by 12 feet, and fungicides were tested to see their curative effect on the natural epidemic. Six fungicides were tested: Heritage (2 fl. oz.), Insignia (0.9 oz.), Cleary 3336 50WP (4 oz.), Daconil Ultrex (3.2 oz.), Prostar 70WP (2.2 oz.) and Chipco 26GT (3 oz.). All currently are registered for control of large patch or brown patch. The fungicides were sprayed three times during the epidemic, 14 days apart: Nov. 2, 16 and 30, 2005. Plots were treated again on March 7, 2006. A shielded plot sprayer was used and was equipped with Teejet 8002ER flat fan nozzles and the volume was 2.1 gallons per 1,000 square feet.

At May River Golf Club, the putting green was built in 2003 under USGA specifications. Existing seashore paspalum was killed by fumigation with methyl bromide, courtesy of Hendrix and Dail Co. on July 22, 2005 and replanted with the same seven cultivars as on the Pee Dee REC green on August 11, 2005, in a randomized complete block design with three replications. The plots were 11 feet by 20 feet.

There were no symptoms of large patch at May River during the natural outbreak at Pee Dee REC. Every cultivar main plot was subdivided into six 3-foot-by-11-foot subplots for fungicide treatments. Four to five oat seeds infested with *R. solani* were placed 10 inches apart from every end of every subplot on every cultivar and every replication. The same fungicides were tested at May River, except for Chipco 26GT. After inoculation, patches developed from the inoculum, but a severe natural epidemic occurred on the putting green and on the fairways of Sea Isle 1 shortly thereafter.

The fungicides were sprayed three times during the epidemic, 14 days apart: Dec. 1, Dec. 15 and Dec. 29, 2005. Plots were treated again on March 9, 2006. Plots were rated for disease severity on a 0 to 10 scale, with 0 equaling no disease and 10 equaling 100 percent of plot area affected, during and after the epidemics, from

IMPACT ON THE BUSINESS

Getting objective about paspalum

BY PAT JONES

Let's face it: It's a little hard to get "jump up and down" excited about most turfgrass varieties. That said, if any one species could be described as a "sensation," it would have to be paspalum.

During the past five years, in particular, many in warm-season climates have jumped on the paspalum bandwagon. And why not? It's tolerant to many environmental stresses, including salt, heat and most heavy metals in effluent water. As potable water becomes less of an option for courses, paspalum is a marvelous alternative. Better yet, newer, finer-leafed varieties have excellent playability characteristics and numerous courses love it as a putting surface.

That said, nothing is perfect and, as the article above points out, vulnerability to patch disease can be a problem.

IMPACT

Like many turf management choices, the decision to use paspulum comes with consequences. In this case, facilities likely will have to consider a preventative fungicide program similar to those used by Northern courses managing bent/poa mix. On a 14-day rotation, disease management costs will likely be higher than with traditional Bermudas or even the improved bents increasingly grown in warm-season areas.

That, of course, presents some budget challenges. However, those potentially could be offset by lower inputs of fertilizer and/or reduced water costs for facilities able to secure less-expensive effluent water.

BOTTOM LINE

Paspalum has the potential to be a revolutionary turf for some facilities. However, the trade-off will be more intense management practices – particularly through establishment. As a side note, the biggest issue associated with paspalum continues to be availability. Its newfound popularity and the relative difficulty of producing it in quantity (sod or seed) had made paspalum a scarce commodity. But, if you can find it, establish it and manage it under the right circumstances, you might well be able to ensure security for your course in a not-too-distant future when water options are exceedingly limited. GCI

Severe symptoms of large patch on seashore paspalum fairways in South Carolina in February 2006. Large patch was so severe with coalescing patches the fairway turf resembled full dormancy. Photos: Alejandro Canegallo and Bruce Martin

October 2005 to March 2006. Turf quality was rated as well, on a 0 to 10 scale, with 0 being worst and 10 being best quality.

RESULTS AND DISCUSSION

Large patch symptoms in natural epidemics on seashore paspalum in South Carolina generally were similar to the disease as it's known in other warm-season turfgrasses. Patches varied in size from 12 inches to as big as several meters in diameter, coalescing frequently.

Isolates obtained from Florida or South Carolina were all identified as *R. solani* AG 2-2 'LP'. The identification was confirmed by culture characteristics, multinucleate hyphae and positive, high frequency anastomosis with a known tester isolate. Koch's Postulates were confirmed in the greenhouse inoculation trials on both cultivars of seashore paspalum.

FUNGICIDE CONTROL OF LARGE PATCH

There were significant differences in the reactions of cultivars of seashore paspalum to large patch and there were significant effects of fungicides on the disease. There was no interaction of fungicides and cultivars, so main effects could be evaluated across fungicides or cultivars. Surprisingly, none of the fungicides tested provided complete control, although curative control of large patch in any grass is difficult.

At Pee Dee REC, the best control resulted from Insignia [mean of disease severity (MDS) = 4.66], Cleary 3336 (MDS = 4.68) and Heritage (MDS = 4.73). Plots treated with Chipco 26GT averaged a MDS of 5.16 and there was no significant difference with the plots treated with Prostar (MDS = 5.25). Plots treated with Daconil Ultrex (MDS = 5.65) had more disease than the control (MDS = 5.50) (LSD=0.3334).

At May River GC, Insignia (MDS = 3.0) and Heritage (MDS = 3.1) were most effective. There were no significant differences between plots treated with Daconil Ultrex (MDS = 3.46) and Prostar (MDS = 3.20) Control plots were the most severely affected with a MDS of 4.32 (LSD=0.4834).

PREVENTIVE APPLICATIONS

All the cultivars under the study were susceptible to large patch disease (*Rhizoctonia solani* AG 2-2 LP). There were some significant differences among the cultivars, with Sea Isle Supreme the least susceptible at both locations, and Sea Isle 2000 the most susceptible at Pee Dee REC and Sea Isle 1 at May River. Epidemics at Pee Dee REC were more severe than at May River. Generally, the colder winters in transition zone climate accounts for more severe large patch in several grasses. Nevertheless, large patch has been a recurring problem on seashore paspalum in the Naples, Fla., region.

The fungicides sprayed after severe epidemics didn't provide adequate control of the disease. The use of preventive applications of fungicides is highly recommended to control large patch on seashore paspalum. **GCI**

Alejandro Canegallo, MS, and Bruce Martin, Ph.D., are from Clemson University in South Carolina. *They acknowledge the assistance of the staff at May River Golf Club in Bluffton, S.C., and the staff at Pee Dee Research and Education Center in this research.*