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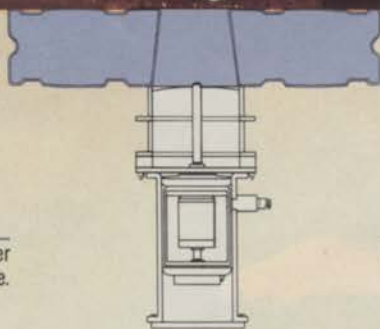
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All Otterbine aerators are safety tested and approved by ETL.

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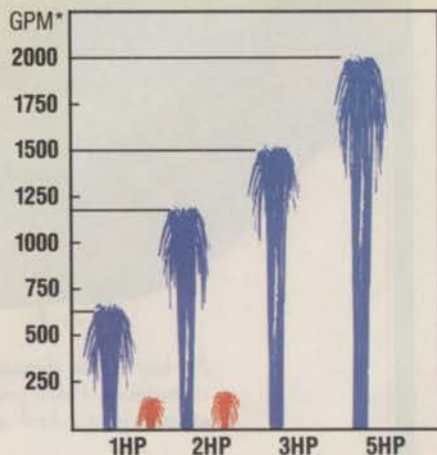
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What's Below The Surface That Counts



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MAINTAINING NATURE'S BALANCE

Restoring and preserving wetlands has become an important consideration in golf course construction.

By Terry McIver, associate editor



'Prior to the concept of mitigation, wetlands were being lost all the time, without being replaced.'

—Steve Beeman

As he might tell you in a matter-of-fact way, Steve Beeman builds swamps and marshes. Not the kind you find in the Florida Everglades, but lush and vital wetlands areas that preserve nature's balance within the confines of Florida golf courses.

Beeman's company, Ecoshores, Inc., of Palm Coast, Fla., restores and mitigates freshwater, estuary and dune environments. A marine biologist by training, Beeman started the company with \$250 in 1978.

Beeman builds and restores wetlands for golf course developments in northern Florida. A spin-off company, Shoreline Associates, Inc., is run by Pam Reeder, who beautifies the southern half of the state with innovative systems for shoreline protection.

"Water management districts now require that new lakes or open water retention ponds be vegetated with 30 percent of the total surface area in wetland littoral shelves," explains Beeman. "Plants and grasses filter out nutrients, pesticides and fertilizers from the system's water before it is released into other waterways. The shelf allows sunlight penetration onto the shallow bottom, making it a rich nursery for aquatic plants and animals."

Reducing hostility

"To mitigate" means to provide relief, or to make less harsh or hostile. Armed with a variety of wetlands plants such as cord grass, pickerelweed and arrowhead *Sagittaria*, Beeman is present at the early stages of a golf course development to insure that the project does not displace a significant amount of marsh wildlife.

At Hammock Dunes, a private golf community in Palm Coast, Fla., for example, developers identified about 40 acres of functioning wetlands to be preserved. Mosquito ditches and borrow pits were opened up and connected to the marshes and lakes to form a water management system.

Today, more than one year later, cord grass flanks the shores around the community's marshes and lakes, alternately submerged and exposed with varying water levels. The grass grows rapidly and creates an extremely dense root mass for effective

erosion control and nutrient uptake.

Taking the initiative

Recent concerns over the depletion of Florida's wetlands makes this concept more popular than when Beeman began Ecoshores 12 years ago. While working as a field biologist for the Florida Department of Environmental Regulation, Beeman noticed that no one was thinking seriously about planting shoreline marshes for erosion control in place of the more costly, often destructive, and bureaucratically controlled method of



To build a marsh: different plants require varying quantities of saturation, referred to as a hydro-period. This staggered planting method also provides insurance against frequent droughts.

sea wall construction.

"We began by planting shorelines for erosion control," recalls Beeman. "As it evolved, we built some sand dunes at ocean front golf courses, then fresh water marsh and swamp construction for mitigation, replacement, and also as habitat creation."

Convincing the skeptics

Beeman's work is highly regarded by many golf course and environmental professionals, which leads to a number of good referrals. Some, however, are not easily convinced.

"We've gotten a lot of respect from some true environmentalists," says Beeman, "but we've also gotten a lot of flak from those who don't want to see developers get another

tool for developing. They don't realize that prior to the concept of mitigation, wetlands were being lost all the time, without being replaced. In my opinion, it's better to replace them and let them evolve back into a natural wetland."

Beeman notes that golf course developments he works on usually end up with more wetlands on the site than existed originally.

"It's usually part of the plan, part of the agreement worked out between the developer and governmental agencies. We're giving more wetlands back, trying to make up for some of the losses of the past 100 years, when people just went in and wiped out wetlands because they were in the way."

A mandatory, three-year monitoring program is followed once a wetlands project is completed, during which wildlife survivability is monitored and nuisance vegetation removed.

According to Beeman, man-made wetlands do indeed function as natural marshes within that three-year time frame.

"The best sign that you can use to tell that a wetland is being utilized is the presence of benthic animals, which are those that live in the sandy marsh bottoms," Beeman explains. "They're turning it into a natural system, part of the food chain."

Ron Andrews, superintendent of the Grand Harbor Club and River Club in Vero Beach, says another reason state and local governments should encourage mitigation is because many projects result in a net gain of wetlands.

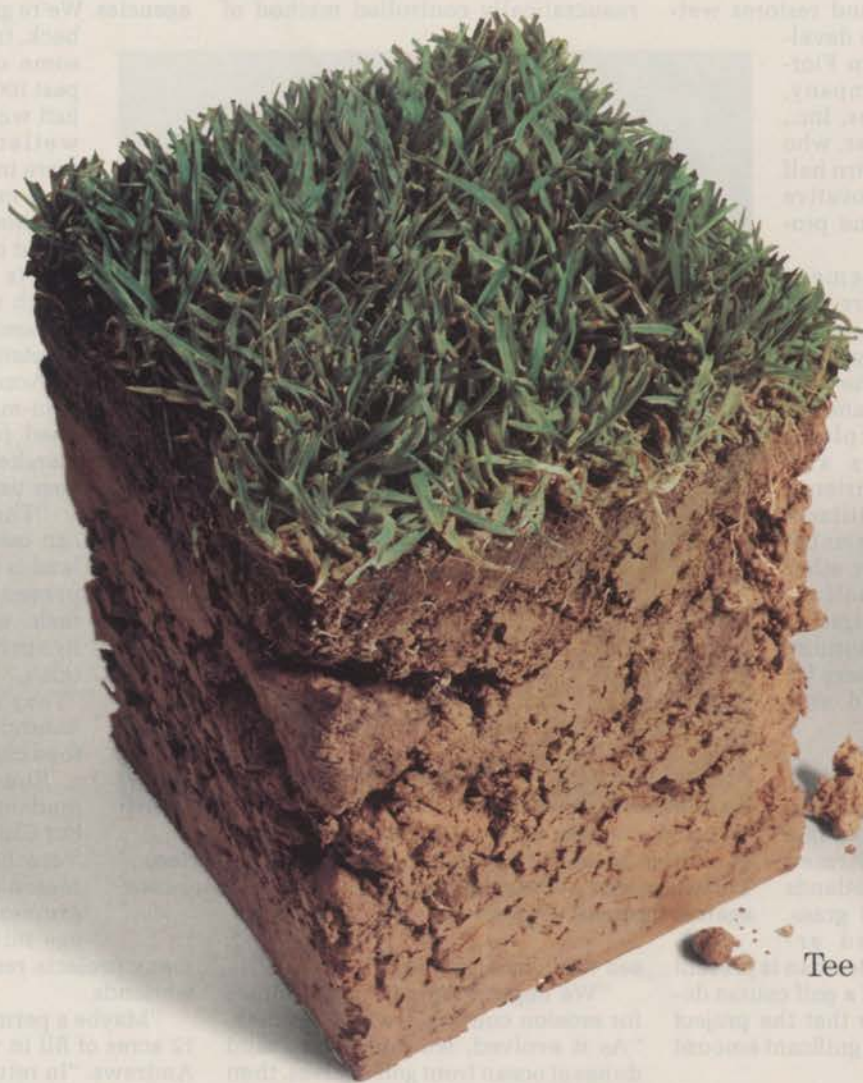
"Maybe a permit like ours allowed 12 acres of fill in wetlands," explains Andrews. "In return for that, they got all that other marsh rehabilitated, along with 43 acres of created marsh."

Andrews believes that if the monitoring program can prove that marsh restoration is successful, more golf course developers will explore mitigation as an advantage when trying to obtain building approval.

Tight government purse strings are another reason Andrews thinks mitigation should be encouraged.

"This is very expensive work," admits Andrews. "The federal government can't afford to do it. And this land cries out to be rehabilitated." LM

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To the homeowner, overall appearance and performance of a turfgrass are more important than the term "dwarfness."

DWARF TALL FESCUE: WHAT TO EXPECT

The only people who may easily see dwarf characteristics of the new dwarf tall fescues are seed farmers. But the other advantages of these fescues are worth checking out.

by Richard Hurley, Ph.D., Lofts Seed, Inc.

During the past 10 years, there has been tremendous breeding activity of turf-type tall fescue.

Recent selection of breeding material has been toward plants that are finer in leaf texture, darker color, producing denser stands of mown turf, with a slower growth rate. The results are quite dramatic when comparing the best of the new releases to KY-31

tall fescue.

At this time, the top performing commercially-available varieties include Rebel Jr., Avanti, Hubbard 87, Shortstop, Guardian, Monarch, Amigo, Thoroughbred, Normarc 99, Shenandoah, Crossfire, Chieftain and Aztec. These varieties are sometimes referred to as "lower-growing types." By people in the seed industry they

are also commonly called "dwarfs" to describe the lower growth habit, slower growth rate and lower overall height of the plants when left unmown and allowed to produce seed.

The term "dwarf" applied to a turf-type tall fescue may not relate to the homeowner, sod grower, golf course superintendent or lawn care specialist. They may not see the dwarf characteristics. The only one who definitely witnesses the lower growth habit is the seed farmer, as the dwarf varieties may attain a lower full mature plant height in comparison with KY-31 or other turf-type varieties.

Scientifically, dwarfness in tall fescues is for real. The factors causing dwarfness or low growth in tall fescues may be a result of one or more of the following:

- (1) genetic dwarfness,
- (2) increased stand density as a result of increased tillering,
- (3) day-length effect with short days of fall and winter causing a change in growth pattern to a lower, slower-growing profile,
- (4) plants selected for breeding have a lower leaf canopy and lower crowns (growing point).

To the consumer, the term "dwarf"

may be misleading. Even though these newer types grow slower and produce fewer clippings per mowing, they still have to be mowed.

Drawbacks

The extreme in dwarfness can have drawbacks. To tolerate wear and withstand foot traffic and other abuses, lawns and turf must keep growing to replace damaged, old or worn-out leaves. Even on the healthiest plant, each leaf lives only 3 to 4 weeks during the growing season.

So a lawn must be actively growing to stay healthy and provide wear tolerance.

Some of the more extreme lower-growing types may not tolerate traffic well as a result of a slow rate of leaf replacement. The lower growth habit is especially apparent during the short days of fall, winter and early spring. When cooler temperatures have slowed the growth rate, the older leaves have been attacked by net blotch (leaf spot). Another concern with the extreme dwarf types is with a

slower rate of establishment and less seedling vigor compared to the original turf-type varieties.

Things to love

The best of the newer commercially-available varieties have characteristics that the consumer can appreciate—like dark green leaf color, fine leaf texture and a dense turf stand.

We should be focusing on overall attractiveness and long-term performance rather than emphasizing the catchword "dwarfness."

continued on page 60

COMPARISON OF TALL FESCUE TYPES

	1 Extreme Dwarf: Turf Types	2 Moderately Low-Growing Turf Types	3 Improved Second Generation Turf Types	4 Original Turf Types	5 Tall Fescues for Low-Maintenance Turfs
Plant height at maturity*	under 35"	Approx. 35-45"	Approx. 45-55"	50" and taller	50" and taller
Leaf texture	Fine	Fine	Finer than 4 & 5	Finer than KY-31	All similar to KY-31
Stand density	Dense	Dense	Moderately dense	More dense than KY-31	More open than turf types
Growth rate	Slow	Moderately slow	Slower than 4 & 5	Slower than KY-31	Moderately fast
Appearance	As attractive as bluegrass	As attractive as bluegrass	More attractive than 4 & 5	More attractive than KY-31	Less attractive as a fine turf compared to a turf types
Color	Dark green	Dark green	Darker than 4 & 5	Darker than Category 5	Light green
Establishment rate from seed	Slower than 2, 3, 4 & 5	Slower than 3, 4 & 5	Moderately fast	Moderately fast	Moderately fast
Comments	May provide less traffic tolerance due to slower rate of growth (leaf replacement). May be more prone to pythium and brown patch in hot, humid areas. Good long, term persistence, especially when maintained at 2-3" or higher.	Good traffic tolerance on established turfs. May show increased disease activity from pythium and brown patch in hot, humid areas. Good long-term persistence, especially when maintained at 2-3" or higher.	Good traffic tolerance on established turfs. Good fall recovery after summer attacks from pythium and brown patch. Good long-term persistence, especially when maintained at 2-3" or higher. Improved shade tolerance.	Good traffic tolerance on established turfs. Good fall recovery after summer attacks of pythium and brown patch. Good long-term persistence, especially when maintained at 2-3" or higher. Good shade tolerance.	Pair traffic tolerance on established turfs. Fewer summer problems from brown patch and pythium compared to groups 1, 2, 3 or 4. Will not persist as well under low height of cut (less than 2-3"). Does not perform as well in shade compared to turf types.
Sample varieties	Bonsai, Shortstop & Mini Mustang	Rebel Jr. & Hubbard 87	Rebel II, Tribute, Apache, Jaguar II & Bonanza	Rebel, Falcon, Hounddog, Olympic, Mustang & Jaguar	KY-31, Fawn, Alta, Kenhy, Tip, Willamette, Mojave, Chesapeake, Clemfine & Richmond

*When left unmown and allowed to produce seedheads.

Source: the author

Performance of commercially available tall fescue cultivars and selections in a turf trial seeded September 1987 at Martinsville, N.J.

Cultivar or Selection	Turf Quality ¹			Texture ² 1989	Density ³ 1989	Color ⁴ 1989
	1988	1989	1988-1989 AVG			
Rebel Jr.	6.4	5.5	6.0	5.5	5.5	6.7
Aztec	6.2	5.7	6.0	6.0	5.2	6.4
Avanti	5.9	5.6	5.8	6.0	5.2	6.4
Hubbard 87	5.6	5.7	5.7	6.0	5.7	5.7
Shortstop	5.7	5.6	5.7	5.7	5.3	6.5
Guardian	5.6	5.7	5.7	5.6	4.7	6.2
Monarch	5.5	5.8	5.7	5.5	6.0	6.6
Normarc 99	5.4	5.8	5.6	5.7	5.4	6.6
Shenandoah	5.9	5.3	5.6	5.8	5.0	6.0
Crossfire	5.5	5.7	5.6	6.1	5.7	6.4
Chieftain	5.8	5.0	5.4	5.7	5.2	5.1
Amigo	5.7	5.1	5.4	5.5	5.9	5.3
Thoroughbred	5.3	5.4	5.4	6.0	5.2	5.2
Trailblazer	5.8	4.8	5.3	5.4	4.7	6.0
Rebel II	5.1	5.4	5.3	5.5	5.4	5.3
Wrangler	5.2	5.2	5.2	5.6	5.5	5.3
Eldorado	5.4	4.9	5.2	4.8	4.9	5.8
Taurus	5.3	4.9	5.1	4.9	4.7	5.7
Sundance	5.3	4.8	5.1	4.8	4.5	5.5
Barnone	5.1	5.0	5.1	5.1	4.5	5.7
Apache	5.2	4.9	5.1	4.7	4.8	5.5
Tribute	5.0	5.1	5.1	5.2	5.4	5.5
Bonanza	5.1	4.8	5.0	6.0	4.5	5.8
Phoenix	4.9	5.0	5.0	4.8	4.8	5.5
Titan	4.9	4.9	4.9	5.5	5.2	4.9
Twilight	5.7	4.1	4.9	5.4	4.4	5.9
Normarc 25	4.9	4.9	4.9	4.9	5.0	5.8
Olympic	4.7	4.9	4.8	4.8	4.4	5.4
Silverado	4.7	4.9	4.8	5.7	4.7	6.4
Winchester	4.8	4.8	4.8	4.7	4.9	5.6
Jaguar II	4.6	4.9	4.8	5.2	4.7	5.3
Murietta	5.1	4.3	4.7	5.8	5.3	5.4
Legend	4.5	4.9	4.7	5.0	4.4	5.5
Carefree	4.5	4.8	4.7	4.9	4.7	4.8
Adventure	4.7	4.6	4.7	4.7	4.5	4.3
Cimmaron	4.9	4.3	4.6	5.2	4.7	5.2
Emperor	4.6	4.6	4.6	5.1	5.0	5.6
Finelawn 5GL	4.3	4.7	4.5	4.7	4.5	5.2
Arid	4.7	4.2	4.5	4.6	4.2	4.5
Jaguar	4.3	4.5	4.4	5.4	4.5	4.7
Mesa	4.5	4.1	4.3	4.7	4.2	5.4
Pacer	4.1	4.4	4.3	4.8	4.2	4.9
Rebel	3.9	4.4	4.2	4.3	3.7	4.1
Richmond	4.3	3.9	4.1	3.8	3.7	4.4
Falcon	4.2	4.0	4.1	4.2	4.0	4.1
Finelawn I	3.8	3.8	3.8	3.7	3.5	4.2
Fatima	3.8	3.7	3.8	3.8	3.8	3.9
Trident	3.7	3.6	3.7	3.7	3.2	5.0
Tip	4.0	3.0	3.5	3.5	3.3	3.7
KY-31	3.7	3.1	3.4	3.0	2.5	3.3
Willamette	3.3	3.3	3.3	3.6	3.7	3.9
LSD at 5% =	0.8	0.7	0.6	0.8	1.0	0.6

¹9 = best turf quality

²9 = finest leaf texture

³9 = densest turf

⁴9 = darkest green color

Source: The author

The variety Rebel Jr. is an example of a lower-growing fescue, but not to the extreme as provided in the variety Bonsai. The more moderate growth pattern of Rebel Jr. and similar types may have a distinct advantage over the more extreme lower-growing types, especially when used in the humid disease-prone areas of the southeast U.S. and middle Atlantic states.

Recent data from variety evaluation trials conducted at Rutgers, University and university-sponsored test sites show a distinct summer decline in some of the newer so-called dwarf-

Many of the newer varieties can produce a denser turf compared to the original turf types.

types (see tables). This may be due to increased disease activity from brown patch and pythium, and possibly less heat and drought tolerance caused by excessive plant density. More research is needed to determine the exact cause of this summer decline as observed on some dwarfs.

Many of the newer varieties can produce a denser turf compared to the original turf types. But turf density can be increased to a degree by other factors, including frequent closer mowing, irrigation and adequate fertility. Although increased turf density provides a more attractive, wear-resistant turf, it may also subject the turf to more drought stress and certain density-associated diseases such as pythium blight and rhizoctonia brown patch.

Everyone should be aware of some claims made within the seed industry when erroneously categorizing some tall fescue varieties as dwarf types. Varieties such as Richmond, Mojave and Willamette should not be confused with dwarfs. In actuality these varieties, along with Clemfine, Tip and Chesapeake, are not much different in overall turf qualities compared to KY-31.

To make matters easier, the varieties of tall fescues presently being marketed can be grouped into five main categories. These categories are summarized in the table on page 58. However, there are additional varieties (many of which are listed in the performance trials that follow) that are intermediate between these five categories.

LM