

Though long considered by many superintendents as one of the best soil amendments to mix with sand when building or rebuilding greens, peat may be wearing out its welcome.

For 40 years, the industry has been using peat and other organics blended with sand for root zone mixes. Peat has been the amendment of choice with architects, builders and superintendents to blend with sand to add nutrient and moisture retention of the greens mix. However, peat and other organic amendments are being challenged in light of the emergence, popularity and success of today's inorganic soil amendments.

A continually growing body of evidence, including research, tests and experiences on golf courses, shows that PROFILE™ Products' porous ceramic, an inorganic amendment, performs better over time than does peat as an ingredient in the root zone mix. With that body of evidence has come acceptance and endorsement by leading architects, builders and superintendents.

Palmer Course Design Company, prompted by positive results and feedback from clients, specifies PROFILE porous ceramic in its designs and renovations. With more than 250 ongoing and completed golf course projects, the architecture firm is a leader in the industry.

“PROFILE's inorganic soil amendment has proven that it withstands the test of time, improves the health of your turf and increases the longevity of your greens,” said Ed Seay, Executive Vice President of Palmer Course Design Company. “It is the only amendment we have this kind of confidence in.”

Research favors PROFILE

Peat, an organic material, helps to improve water and nutrient holding in the greens' root zone. But, as tests and real life experiences have shown, peat fills air pore space and reduces drainage. Peat also changes with time which may contribute to large pore space being lost, possibly resulting in low oxygen levels, black layering and poor drainage. The consequences can be poor playability and reconstruction of the greens.

Research shows that when peat moss such as sphagnum or reed-sedge peat is used as an amendment in the root zone mix, fine particles can hinder air and

Root Zone Amendments: PROFILE vs. Peat



PROFILE vs. peat

Comparison of 8-year-old PROFILE-amended greens vs. 6-year-old greens amended with organic material

A comparison of soil analyses between 8-year-old PROFILE-amended greens at Bay Hill's Charger Course³ and 6-year-old peat-amended greens at the Cordillera Mountain Course near Vail, Colo.,⁴ illustrates that even after 8 years PROFILE's outperforms peat in drainage and air pore space.

Root Zone Mix	Drainage (in/hr)		Porosity (%)			
			Non-capillary (Air-holding/drainage)		Capillary (Water-holding)	
Sand/PROFILE after 8 years (Bay Hill's Charger Course)	Original 28.1	8 years 9.1	Original 25.5	8 years 24.8	Original 12.3	8 years 20.8
Sand/Peat after 6 years (Cordillera Mountain Course)	Original 23.8	6 years 3.1	Original 22.1	6 years 13.9	Original 20.7	6 years 32.7
USGA Recommendations						
Normal range:	6-12		15-30		15-25	
Accelerated range	12-24					

water circulation. Poor aeration, high moisture

content and low temperature and pH, combined with the application of iron chelate, create optimal conditions for black layer in putting greens.¹

In a separate study, researchers came to the following conclusion after analyzing four tests of organic matter as a soil amendment:

“From the time grass is established, the soil physical characteristics of the root zone begin to change. Increased organic matter is predictable, considering the continuous growth and death of grass shoots and roots that occur on greens. This process fills aeration pores (macropores) of the sand and increases the amount of capillary pore space (micropores). As a gel-like mass of dead root material fills macropores, aeration porosity is reduced, saturated hydraulic conductivity (drainage) declines, and soil oxygen diminishes.”²

Research points out clearly that percolation rates on sand/peat-amended greens drastically reduces over time. Good drainage, of course, is vital to the health of a green.

Unlike peat, PROFILE porous ceramic is an inorganic amendment that changes little over time. A sand/PROFILE mix will remain more consistent for the life of the green. Mixed with the right sand, PROFILE helps bring about ideal soil conditions: 50 percent solid matter, 25 percent water-holding pore space and 25 percent air-holding and drainage pore space.

Therefore, sand/PROFILE root zone mix has the ability to better maintain optimal water and nutrients without reducing large pore space and slowing down drainage. That combination keeps plenty of oxygen in the soil, which is the key to a strong root system and healthy,



In 118° F in August 2002, the expansion of the 2-year-old Whisper Rock Green revealed 8- to 10-inch bent grass roots. “Profile is keeping the drainage up and providing the air to keep these roots deep.”

Mike Pock, Superintendent Whisper Rock Golf Club

Plug from 2-year-old bentgrass green at Whisper Rock Golf Club in Scottsdale, Ariz., taken in August 2002.

Comparison of PROFILE vs. peat

Test results like these, conducted for The Ginn Company on its new Tesoro Course, Stuart, Fla., consistently illustrate how PROFILE outperforms peat in drainage rates, total porosity and pH balance. ⁵

Root Zone Mix			Drainage (in/hr)	Porosity (%)			Water Retention	pH
PROFILE (%)	Sand (%)	Peat (%)		Non-capillary (Air-holding/drainage)	Capillary (Water-holding)	Total		
0	100	0	23.3	22.2	15.5	37.7	9.4	4.7
15	85	0	28.3	24.7	17.9	42.6	11.9	5.4
0	85	15	12.2	20.5	20.4	40.9	13.2	4.2
USGA Recommendations								
Normal range:			6-12	15-30	15-25			
Accelerated range			12-24					

stable greens.

So what does this mean to superintendents? It means they can have confidence knowing their greens will withstand the test of time. And it means superintendents can look forward to spending less in maintenance costs for irrigation, fertility, aerification and labor during the life of the green.

Norm Pilote, director of golf course operations at Frenchman's Creek Country Club in Palm Beach Gardens, Fla., is looking forward to cutting his costs there when renovation of his north course's greens and tees begins in March 2004. A sand/PROFILE root zone mix will replace peat and sand.

Pilote's excitement is well founded. He has previous experience in maintaining both sand/peat greens and 36 holes of sand/PROFILE greens at Sea Island in the Southeast.

"I was always having to send out two or three guys to chase hot spots with a hose because the sand/peat greens needed more irrigation," Pilote said. "With the PROFILE-based greens, I didn't have to do that."

Results speak for themselves

Today, the owners and representatives of more than 100 golf courses have constructed sand/PROFILE greens. Courses from the northeast like Willowbend Country Club and Black Rock Country Club in Massachusetts to repeat customers like the Robert Trent Jones Golf Trail in Alabama have had great success with sand/PROFILE greens. The Trail recently placed a 1,200 ton PROFILE order for construction of three new courses after having success over the past few years with three previous courses constructed with sand/PROFILE greens.

PROFILE porous ceramic was first used as a soil amendment in 1992 at the Oasis Golf Club in Mesquite, Nev. Kelby Hughes, then superintendent at the Arnold Palmer-designed course, said the greens continue to thrive today at the Oasis. When it came time for Hughes to select an amendment in 2001 for his new course, Wolf Creek at Paradise Canyon, in Mesquite, Nev., the choice was easy.

"I didn't hesitate," Hughes said. "I've seen proof that PROFILE provides better, healthier greens." In 2001,



Bay Hill Club and Lodge's long-term success with PROFILE in the root zone mix of the Charger course, built in 1995, led them to renovate their Championship course greens with PROFILE in 2001.

The greens at the Oasis Golf Course in Mesquite, Nevada, constructed with a sand/PROFILE mix in 1992, continue to thrive.

PROFILE vs. peat

Golf Digest tabbed Wolf Creek at Paradise Canyon as the third best new golf course in the nation.

PROFILE porous ceramic is being used to make good golf courses better. In 2001, Bay Hill Club and Lodge in Orlando, Fla., removed the organic material in the root zone mix of its Championship course, home to the PGA Tour's Bay Hill Invitational, and replaced it with a mix of 80 percent sand and 20 percent PROFILE.

"The Championship greens are performing very well," said John Anderson, Bay Hill's superintendent. "PROFILE keeps the greens draining, and that means more air in the root zone where it's most needed. PROFILE also helps us with the retention of water and nutrients. We now have healthy greens that will hold up to the low mowing heights and traffic associated with a professional tour event."

Tim Lacy, a long-time user of peat and director of Golf and Grounds Maintenance at Pursell Technologies' FarmLinks Golf Club in Alabama, was impressed last summer with how the PROFILE-amended bentgrass greens grew-in without a hitch in the hot climate of the Deep South. Several samples taken during the grow-in stage showed that percolation rates were ideal, and that the root zone mix remained as consistent and uniform as the day it was added to the greens during construction.

"One of the main reasons I went with PROFILE was because I feel like the greens we have today are going to be consistent with the greens we'll have 10 years from now," said Lacy. "I would never build another golf course without using PROFILE; that would be my recommendation to superintendents."

At Whisper Rock Golf Club in Scottsdale, Ariz., builders installed a root zone mix of 13 percent PROFILE and 87 percent sand during construction in September 2000. Over the next two years, superintendent Mike Pock said his greens thrived throughout the summer and easily outperformed sand/peat-based greens that he previously maintained.

Pock said PROFILE promotes healthy, firm greens that don't give way easily to ball and spike marks.

"All of our members are very pleased with the greens, and I am as well," he said.

The importance of putting time, energy and money into

construction of greens should not be overlooked.

Cost is often cited as the reason PROFILE is not included in specifications for greens. Cost should be a big concern for owners, but greens are the most important part of the golf course and quality greens bring golfers back. The investment to build greens with the best methods and components not only provide superior greens for golfers, but also require less money to maintain and last many years longer than poorly constructed greens.

An industry expert has stated, "Like the irrigation system and drainage, the construction of greens is not an area in which corners should be cut in an effort to save money. Well-built greens are much less expensive to maintain throughout the remainder of their lives."

PROFILE vs. rest of the field

In addition to peat, PROFILE has the upper hand over other inorganic soil amendments. A PROFILE particle has 74 percent water and air pore space, which allows it to hold water and oxygen in a nearly perfect balance. PROFILE increases drainage and water-holding capacity at the same time. It also meets USGA particle size distribution recommendations and stability requirements, and provides a high CEC.

PROFILE has also proven to have more consistent quality and to be a more consistent performer. PROFILE Products LLC owns, operates and controls all aspects of mining and manufacturing of its product. PROFILE is engineered from a proprietary blend of amorphous silica, illite and montmorillonite clays. The mineral is screened, sized and kiln fired, changing it into a porous ceramic. The final product is a superior inorganic soil amendment that is less dusty, less brittle and more stable than other amendments.

For copies of all the research and names of superintendents in your area who use PROFILE, call us at 1-800-207-6457.

Literature cited

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