THE BLACK DEATH

Researchers agree on some curative methods for black layer on golf course greens, but they still don't seem to agree on all of the causes.

Turf researchers now agree that black layer on golf course greens can be dealt with.

Not long ago, it was thought the superintendent had to replace the green once the condition occurred. While this remains a viable—though expensive—option, principle researchers of the condition find that cultural practices can alleviate it.

Number one

Aeration is number one on the list. "I'm talking slicers, spikers—anything to break up the surfaces," notes John Hall III, Ph.D. at Virginia Tech University.

The condition apparently arises from a number of causes, but commonly from lack of oxygen combined with excess moisture. "The concern is that we have oxygen in the soil so it can breathe," Hall says.

Compaction, or layering related to the condition, is cured through coring. Regular aerators help, but deep aeration may be necessary to get through the layering. Judicious use of irrigation and fertilization also helps alleviate the effects.

Opinions vary on the causes, however. Here is what some researchers say:

Hall: "The pressure on (superintendents) has increased in recent years because of traffic on your courses. There were 25,000 to 30,000 rounds played per course in 1960; there were 65,000 to 70,000 per course in 1987. We have moved toward sandier media to reduce the amount of stress due to increased traffic."

Hall has found these contributors to the condition: sulfur; blue-green algae; salinity greater than 10; podsolization (the maturing of intensely-managed soils through leaching of iron, aluminum and silicate compounds); silt and clay stratification; low phosphorous; high metal concentrations; and "chromatographic irrigation." He believes black layer is not a common problem.

Clint Hodges, Ph.D., Iowa State University: "You don't have to have an anaerobic condition for the layer to start. But there is some component produced by the algae that you have to have. It can start in aerobic conditions. We are

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Hodges: accelerating nature

simply accelerating a natural system. If we are going to continue our management practices, then we'll have to deal with it. We don't really know what kills the grass. The system we're working with shows iron is enemy No. 1, sulfate is enemy No. 2."

Roy Goss, Ph.D., Washington State University: "It all comes back to oxygen exchange within the soils. Even though you aerify, a 3½-inch depth may not be adequate. It could occur below that. We need to cure the condition first, then fertilize the turf."

Bob Shearman, Ph.D., University of Nebraska, using figures obtained in a GCSAA survey, says the conditon can occur in any region on any turf, but most often occurred on bentgrass or bentgrass/poa greens, usually in July or August. "Why is it showing up more now?" Shearman asks. "Water management is the critical issue. We need to be judicious in meeting the evapotranspiration demand of the grass. Nutrition plays an important role. The best results are with aerification and the use of wetting agents."

Application of a balanced fertilizer containing equal amounts of nitrogen and phosphorous helps.

Jim Tiedje, Ph.D., microbiologist, Michigan State University: "Black layer is very common in nature." He believes there are four conditions that must be present to have black layer: anaerobic conditions; a food supply; sulfur compounds; and sulfur-reducing compounds. Anaerobic conditions form from restricted oxygen supply and increased oxygen consumption, he says.

Joe Vargas, Ph.D., Michigan State, notes the condition is not unique to sand but occurs in soil as well. "We could all tolerate black layer if it didn't kill the turf," he says. Vargas believes it is caused by a relationship between algae and sulfur. "Sulfur takes oxygen out of the system, making it anaerobic." He says conditions are caused by excess irrigation, heavy rains and poor aeration down in the soil.

Stan Zontek, USGA Green Section, notes three types of black layer, two being: anything black, such as peat, but not a "bad black layer;" and a type which forms from physical differences in the soil such as layering. This type is easy to manage physically, he says. It can be combatted with core aeration and back-filling with sand or rebuilding the greens.

"The third type gives us the most concern," he says. It occurs just below the surface thatch layer, "even on USGA-specked greens. It's the result of something living in the soil. This type is associated with greens in pockets of slow air circulation." Sulfur is a cause, but not a direct one, he says. "Sulfur occurs naturally everywhere so backing off (applications) won't help that much." He explains that sand can have a hand in forming the layer if the high-draining media sits atop a much slower draining media like a clay soil.

Applications of a balanced fertilizer containing equal amounts of nitrogen and phosphorous also helps. Drainage improvements are necessary. "Build a new soil structure on top of the old but without causing layers." He emphasizes not changing top dressing media radically but getting a gradual transition in the particle size mix. He suggests raising cutting heights in the summer and aerating both shallow and deep. "Black layer is not AIDS," he concludes. "Not everyone is going to get it, and it can be gotten rid of."

So if you have it, it's not the end of the world. Solutions to the problem are agreed upon—even if the causes vary by source. **LM**