Strategies for Organic Matter Control

Using scientific and empirical approaches for managing organic matter accumulation can be frustrating.

BY PAUL VERMEULEN AND CHRIS HARTWIGER

Few things in golf are more annoying than putting greens with too much organic matter accumulation. For golfers, the putting surface is degraded by footprinting, excessive ball marks, and inconsistent ball roll. For superintendents, the turf is more prone to disease and insect activity, development of hydrophobic conditions, and mower scalping. On the opposite end of the scale, putting greens with too little organic matter accumulation have poor sod strength and little resilience to incoming shots.

Being that either too much or too little organic matter accumulation is problematic, the question that begs to be answered is, "How much organic matter is just right?" In the practice of golf course management, there are two common approaches to finding the right answer to this question. There is the scientific approach, involving the review of pertinent university studies, and the empirical approach, involving field observation.

A review of university studies and relevant magazine articles indeed suggests that organic matter content can be quantified as a percentage by weight and that this information can be useful for making management decisions as well as monitoring accumulation over time. The rub is that the recommendations for optimum organic matter content set forth by scientists range from 1.5% to as much as 8%.

To appreciate the differences between varying organic matter values, one can look at the many different ways samples are taken in the field and subsequently analyzed by laboratory personnel. In research studies, some scientists prefer to take samples from the upper 25 centimeters of a soil profile and include the turf on top. Others take samples as deep as 35 centimeters and remove the verdure. Because deeper samples contain a greater volume of soil relative to organic matter, the latter studies tend to suggest lower organic matter measurements.

To reduce excessive accumulations of organic matter in putting greens, many superintendents apply a large volume of topdressing material following core aerification.

When superintendents want to determine the organic matter content of their putting greens, some submit an intact, 6-inch-deep turf plug to a physical soil testing laboratory that dissects it into layers upon receipt. Others have their soil samples collected between a .25-inch and 4-inch depth and tested for organic matter content at the same time they are being analyzed for nutrient status. Not only is the sampling protocol different from that typically used in research studies, but different laboratories use different testing procedures for determining organic matter content. Such discrepancies in sampling and laboratory testing can produce radically different results for superintendents with essentially identical circumstances. Further, their results are difficult, if not impossible, to correlate with research studies.

In a perfect world, the turfgrass industry would use uniform sampling and testing protocols for organic matter content that take into account quality as well as quantity. Because idealized protocols have yet to be agreed upon by all parties concerned, the practical message here is that one should only compare notes with others using the same methods of sample collection and laboratory processing.

Another interesting point to consider is that research studies have yet to show a conclusive link between imminent turf failure and a specific value for organic matter content. Current research studies suggest that the potential for management difficulties increases across a range of organic matter measurements and other factors, such as climate, and can have an overshadowing effect. With this in mind, it would seem reasonable to correlate organic matter test results with turf quality and performance during stressful environmental conditions to determine if there is a need for changing an otherwise successful maintenance program.

To make an empirical attempt at answering the question of how much organic matter is just right, each Green

Section office surveyed ten or more superintendents who manage high-quality putting surfaces in their region. The purpose of this survey was to look at current efforts to manage organic matter accumulation through the application of topdressing material on the putting surface and in the open voids created by aeration practices. In addition, the survey was designed to identify possible regional trends, such as a gradual increase in topdressing usage from north to south and east to west coinciding with the overall length of the growing season. By focusing on topdressing, the survey assumed that organic matter content decreases and the benefits thereof increase as the annual rate of topdressing increases.

The results of the survey are tabulated in Table 1. The mean value represents the average annual rate of topdressing for courses surveyed by each office in each region. Intuitively, one's impulse is to view a survey mean as a benchmark of sorts. Further, values greater than the mean might be considered as being superior in some form or fashion. In this survey, however, the mean topdressing rate is intended to reflect a point of diminishing benefit or, more accurately, the amount of topdressing material that is required to manage organic matter accumulation at a level that is just right.

Unfortunately, to make the conclusion that the mean topdressing rate reflects the amount of material required to precisely manage organic matter accumulation, the range and standard deviation for the survey data would have to be much smaller than the values shown in this survey. In other words, if superintendents have a sixth sense for an organic matter content that is just right, then the survey data should have revealed a stronger consensus in topdressing usage among superintendents at well-maintained courses in close proximity to one another. The data from most regions in this survey, however, almost seem to suggest that well-maintained courses in close proximity to one another apply topdressing material for the purpose of managing organic matter without recognizing a rate of diminishing benefit.

For example, in the Mid-Continent Region's Carrollton, Texas, office, the mean and standard deviation are 37.1 and 9.1, respectively. The high standard deviation basically tells us that the majority of the surveyed courses use anywhere between 28 and 46.2 cu. ft. per 1,000 sq. ft. per year of topdressing material during an entire growing season. This equates to a difference of more than 100 tons of topdressing material between courses that have approximately 130,000 sq. ft. of putting surface.

Given the broad distribution of data found in this survey, it would also be premature to use it for gauging regional topdressing recommendations. As a case in point, there is almost a two-fold difference in the mean topdressing rate for the two halves of the Mid-Atlantic Region. If the data were used as a foundation for making recommendations, should the higher or the lower value be used?

If there is a strong conclusion to be made from the survey, it is probably that it generates multiple questions regarding current industry practices and suggests the need to conduct further research. For starters, perhaps a straightforward experiment can be conducted using varying topdressing rates that could ultimately serve as a foundation for making regional recommendations.

All superintendents know that diluting organic matter accumulation with topdressing material delivers playability and agronomic benefits. Nevertheless, answering the simple question of what is the right amount of organic matter has proven to be elusive. Maybe it's because the question is not as simple as we would all like to think.

REFERENCES

Beard, James B. 2002. Turf Management for Golf Courses, Second Edition. Ann Arbor Press, Chelsea, Michigan.

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Table 1
Topdressing survey results for ten or more well-maintained golf courses within each Green Section office's region.

Green Section Office	Topdressing Rate ($ft^3/1,000\ ft^2/yr$)		
	Mean	Range	Standard Deviation
Cool-Season Turfgrass			
Mid-Atlantic — Glen Mills, Pa.	16.0	7.5 - 26.3	6.7
Mid-Atlantic — Pittsburgh, Pa.	27.1	14.5 - 51.1	11.1
Mid-Continent — Carrollton, Texas	37.1	21.8 - 52.5	9.1
Mid-Continent — White Heath, Ill.	20.7	15.8 - 30.6	4.5
North-Central — Covington, Ky.	18.5	8.3 - 25.4	7.6
North-Central — Elm Grove, Wis.	20.7	8.4 - 34.5	8.2
Northeast — Palmer, Mass., and Easton, Pa.	20.3	12.0 - 51.7	8.8
Northwest — Gig Harbor, Wash.	31.6	22.5 - 39.4	5.8
Northwest — Twin Falls, Idaho	24.7	5.3 - 43.1	11.5
Southeast — Griffin, Ga.	34.3	14.6 - 65.5	14.3
Southwest — Santa Ana, Calif.	37.9	10.7 - 70.3	23.8
Warm-Season Turgrass			
Florida — Hobe Sound, Fla.	44.3	17.4 - 101.7	28.2
Florida — Rotonda West, Fla.	90.2	62.9 - 147.6	36.6
Mid-Continent — Carrollton, Texas	38.0	22.3 - 85.5	17.3
Southeast — Birmingham, Ala.	38.2	17.1 - 85.5	22.5
Southwest — Santa Ana, Calif.	24.1	11.4 - 33.7	12.0