Soil organic matter by depth

Micah Woods

March 7, 2023

Manitoba Golf & Turf Conference

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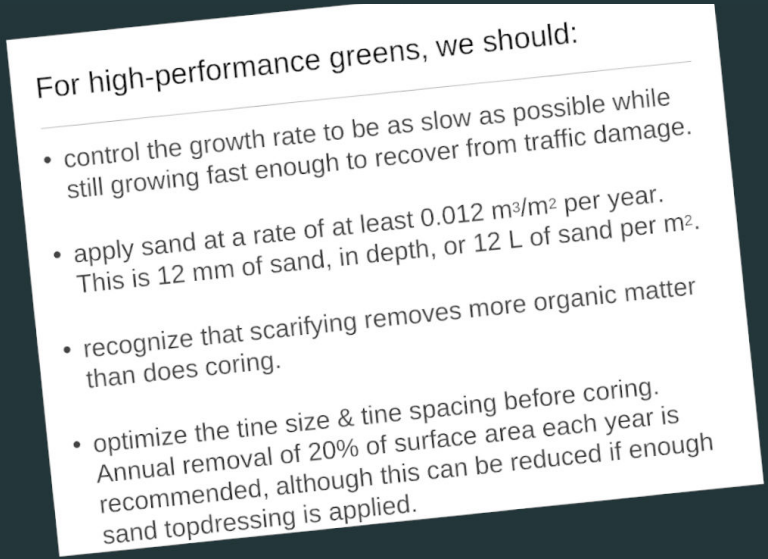
What I recommended previously

A slide from *my presentation* in March 2014



For high-performance greens, we should:

- control the growth rate to be as slow as possible while still growing fast enough to recover from traffic damage.
- apply sand at a rate of at least 0.012 m^3/m^2 per year. This is 12 mm of sand, in depth, or 12 L of sand per m^2.
- recognize that scarifying removes more organic matter than does coring.
- optimize the tine size & tine spacing before coring. Annual removal of 20% of surface area each year is recommended, although this can be reduced if enough sand topdressing is applied.

Managing Organic Matter in Putting Greens

Effectively managing organic matter will help create the firm and smooth putting greens that golfers have come to expect.

BY ADAM MOELLER AND TODD LOWE

Soft playing conditions, deep ball marks, inconsistent green speed, and bumpy putting surfaces frustrate golfers and golf course superintendents. If golfers and superintendents both want firm and smooth putting greens, why do some facilities struggle to achieve these conditions? Putting greens might be temporarily soft or inconsistent for many reasons, such as recent rainfall, but when there are chronic issues the underlying problem is often excessive organic matter just beneath the putting surface.

Core aeration, verticutting, and topdressing are the primary agronomic practices used to manage organic matter, but they are disliked by most golfers. The choice for superintendents is a difficult one: Upset golfers by failing to produce the desired playing conditions, or upset them by occasionally implementing disruptive programs that are necessary to produce the desired conditions. Since course conditioning

“the underlying problem is often excessive organic matter just beneath the putting surface. Core aeration, verticutting, and topdressing are the primary agronomic practices used to manage organic matter, but they are disliked by most golfers.”

Moeller & Lowe, 2016

“There are many agronomic programs that influence the playability and health of putting greens, but organic matter management is arguably the most important.”

Moeller & Lowe, 2016

“In general, organic matter accumulates when programs that dilute organic matter are not keeping pace with organic matter production.”

Moeller & Lowe, 2016

> *“0.5-1.5 cubic feet per 1,000 square feet every 7-14 days effectively dilutes organic matter throughout the growing season”*

Moeller & Lowe, 2016

That is 0.15 to 0.45 mm of sand every 7 to 14 days. That’s 2,400 to 7,200 kg/ha every 7 to 14 days.

What I recommend now

Recommended approach

Check surface zone total organic material once a year

Then, compare the OM change to:

- annual N rate
- annual sand topdressing amount
- annual aerification impact
- annual clipping volume (if you have it)

Anything resembling thatch or mat is *explicitly excluded* from the soil organic matter measurement made on routine soil nutrient analyses.

That portion of soil organic matter is excluded because it is not measured. Those big chunks of organic matter are removed from the sample prior to testing by passing the sample through a 2 mm sieve. And there is a good reason for that.

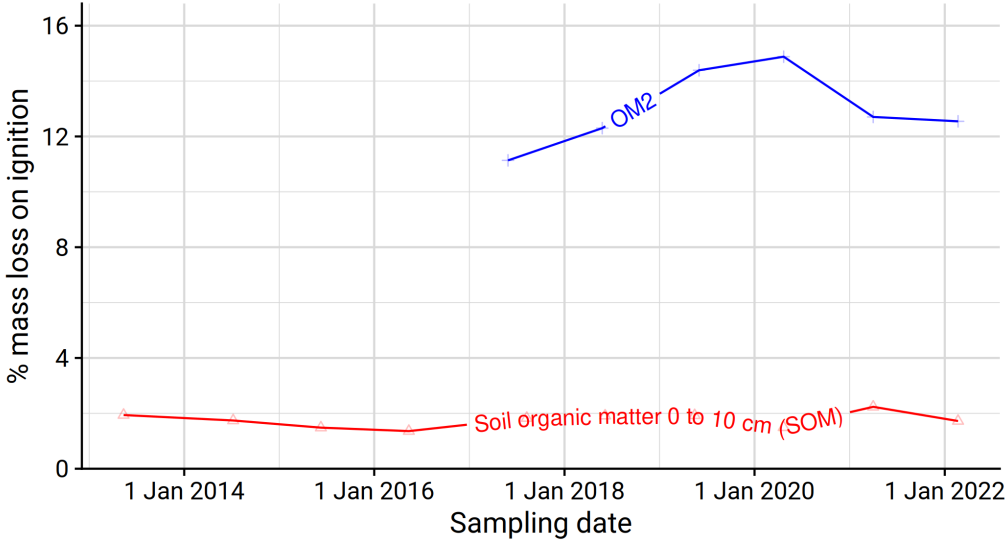
This small material that does get tested is humus, and it meets the definition of soil organic matter in the Soil Science Society of America's glossary.

soil organic matter: *The organic fraction of the soil exclusive of undecayed plant and animal residues. See also* **humus**.

humus: *The well decomposed, more or less stable part of the organic matter in mineral soils.*

Zoysia (korai) putting greens

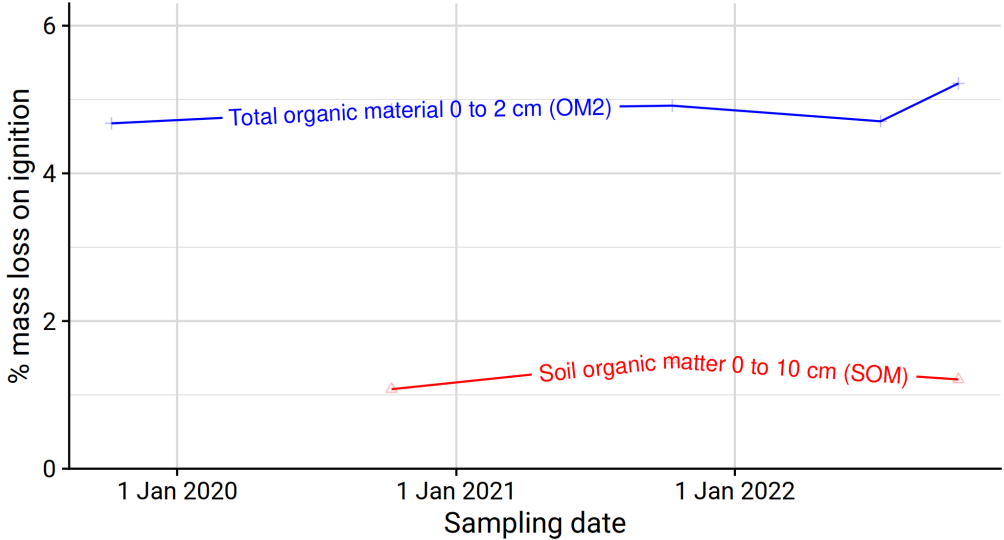
samples from Keya GC



All soil tests conducted at Brookside Labs

Creeping bentgrass putting greens

samples from Hazeltine National GC



All soil tests conducted at Brookside Labs

Five korai 0 to 20 mm cores

After muffle furnace at 360 °C

After stirring the sample

Five korai 0 to 20 mm cores

After muffle furnace at 440 °C

After stirring the sample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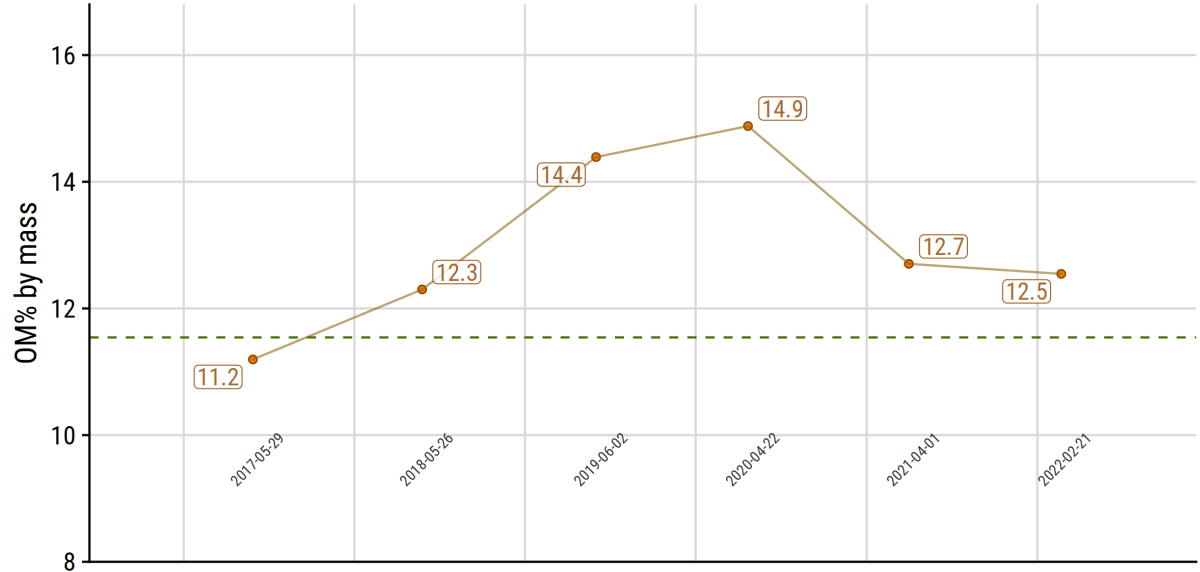
PV
19
SP
440
AL 1
OUT
UT150
SET/ENT

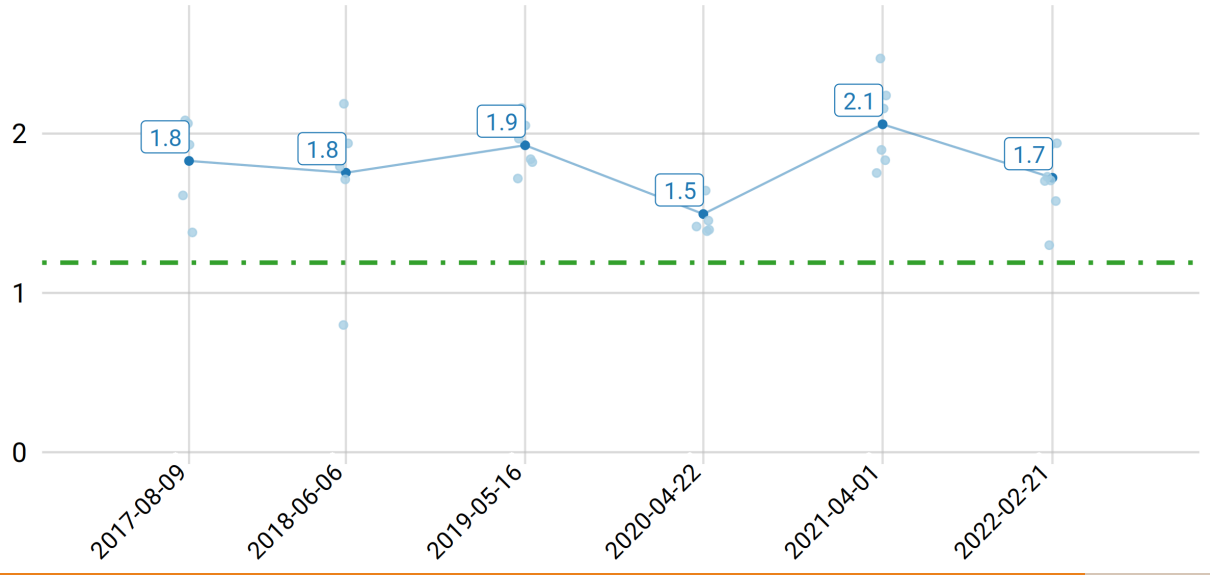
Total organic material time series

0 to 2 cm

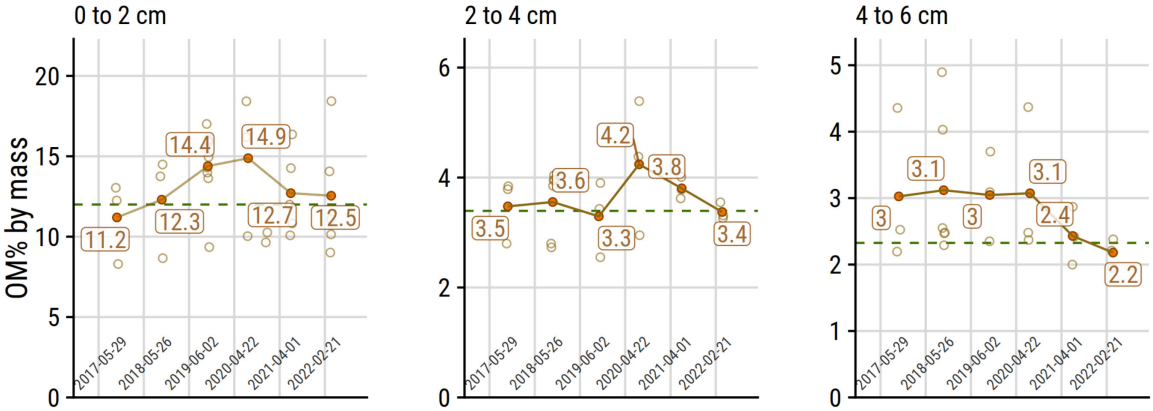


Soil organic matter (OM)

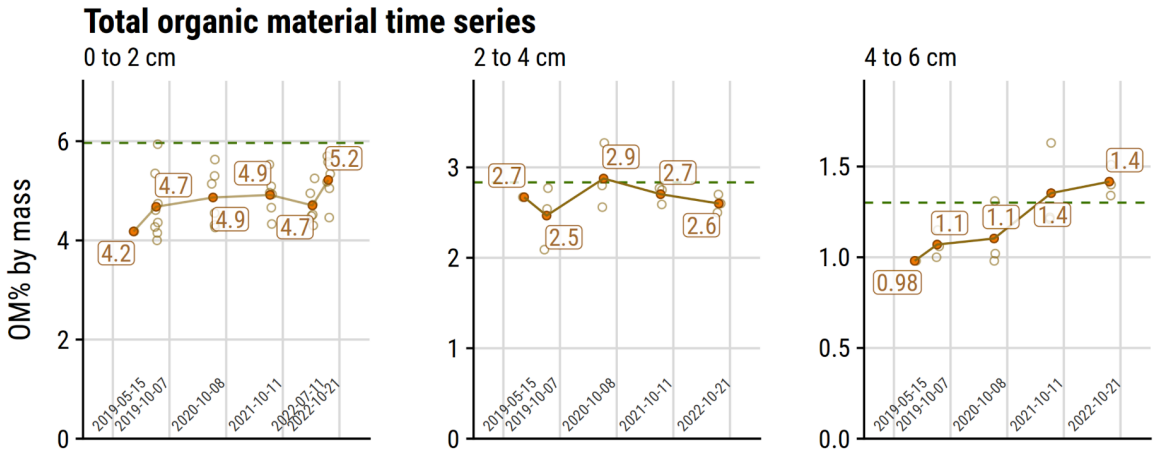
% by mass



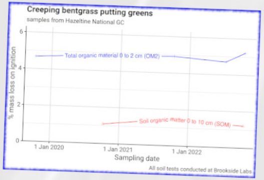
Total organic material time series



The horizontal dashed line marks the average value (50th percentile) of all zoysia samples at that depth.


Total organic material time series
0 to 2 cm
2 to 4 cm
4 to 6 cm
OM% by mass
4.2
4.7
4.9
4.9
4.7
5.2
2.7
2.5
2.9
2.7
2.6
0.98
1.1
1.1
1.4
1.4
2019-05-15
2019-10-07
2020-10-08
2021-10-11
2022-07-11
2022-10-21

Soil organic matter by depth



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A Year of Measuring Putting Green Performance

Taking the time to collect information about putting green performance pays off with more insight and improved management efficiency.

BY CHRIS HARTWIGER

As an agronomist, I am curious about what well-performing putting greens have in common. Are there things that good putting greens have in common, or are there many different paths to the same destination? How does performance fluctuate during a year, or among many years? When I ask these questions in the field, I find there are few golf courses that collect and consolidate information about putting green performance and management inputs that would allow them to provide definitive answers.

In 2018, USGA agronomist Addison Barden and I embarked on a project with six different golf courses to answer these questions by collecting daily putting green management information. Through this process of data collection and analysis, we hoped the participating golf course superintendents would use this newly accumulated information to make decisions that would smooth out the peaks and valleys in putting green performance and optimize the allocation of resources in managing their putting greens. This article will share a few details about the project, what we learned, and how you might use data collection to improve

Collecting and visualizing data of key surface performance indicators and inputs enables superintendents to efficiently achieve specific surface performance goals with greater consistency.