OM246, organic matter/material, & sand topdressing

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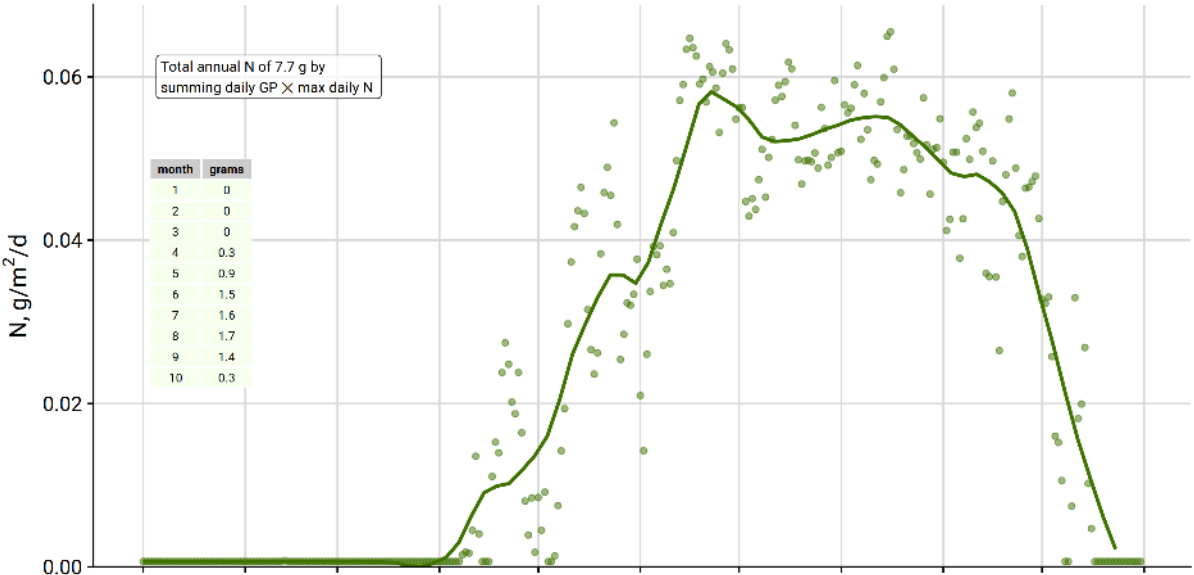
November 3, 2023

Asian Turfgrass Center
www.asianturfgrass.com

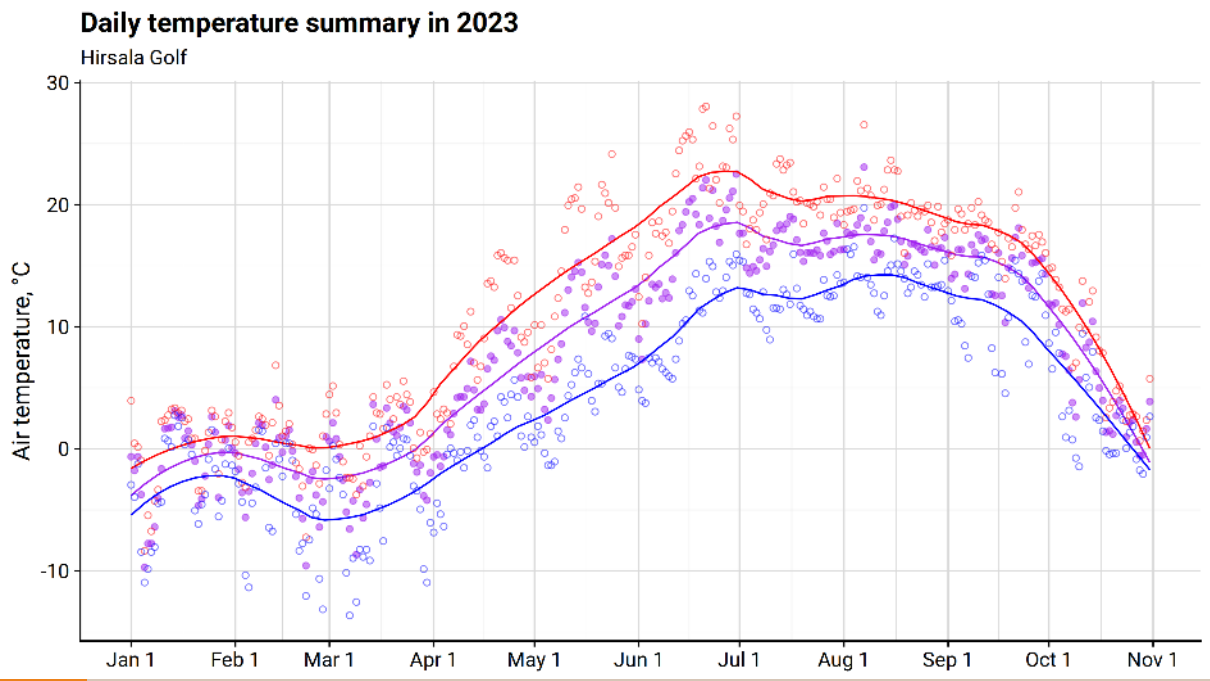
PACE Turf
www.paceturf.org

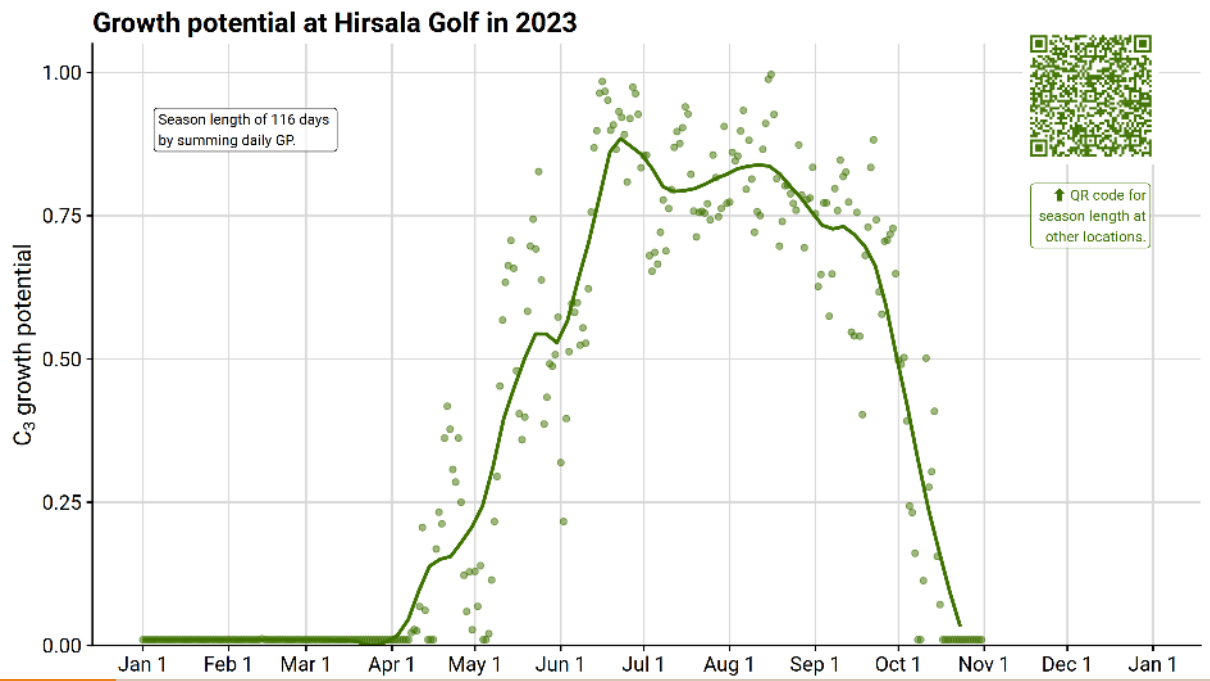
Winter Turf project

Predicted daily N by GP in 2023



month	grams
1	0
2	0
3	0
4	0.3
5	0.9
6	1.5
7	1.6
8	1.7
9	1.4
10	0.3


Daily temperature summary in 2023
Hirsala Golf
Air temperature, °C
30
20
10
0
-10
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1


Growth potential at Hirsala Golf in 2023
Season length of 116 days by summing daily GP.
QR code for season length at other locations.
C_3 growth potential
1.00
0.75
0.50
0.25
0.00
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Dec 1
Jan 1

Growth ratio

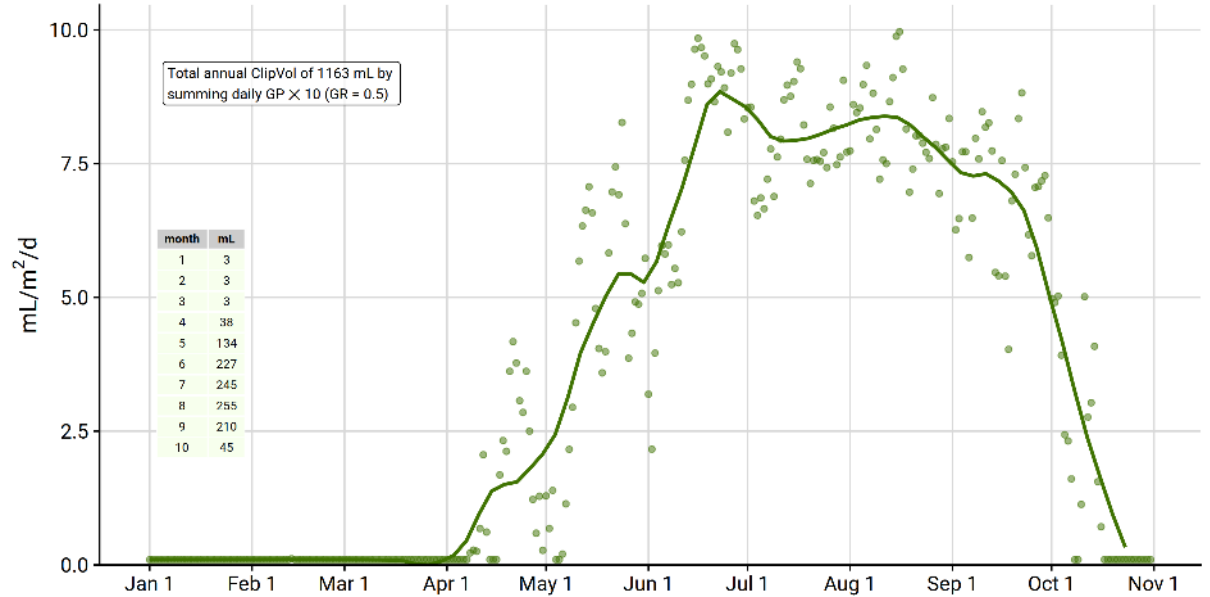
$$\frac{ClipVol}{20(GP)} = GR$$

where...

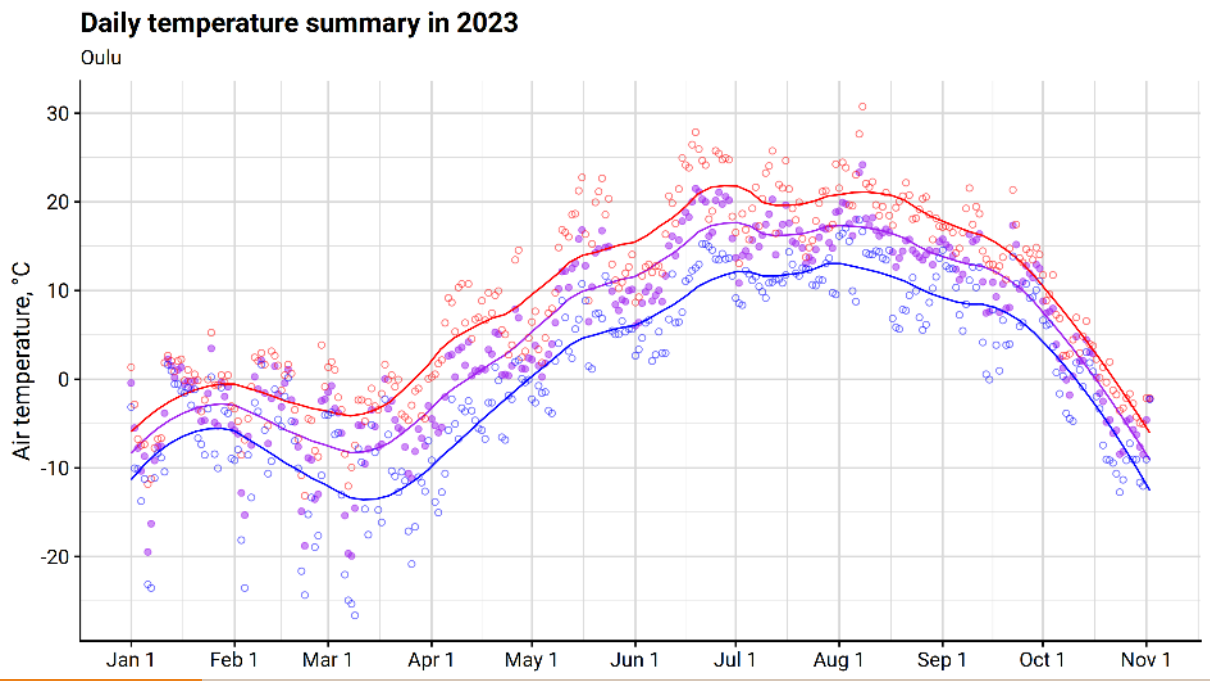
GR is the turfgrass growth ratio
ClipVol is the clipping volume, expressed in units of mL/m^2
20 is the *standard* amount of clippings, set at 20 mL/m^2
GP is the temperature-based turfgrass growth potential developed by PACE Turf

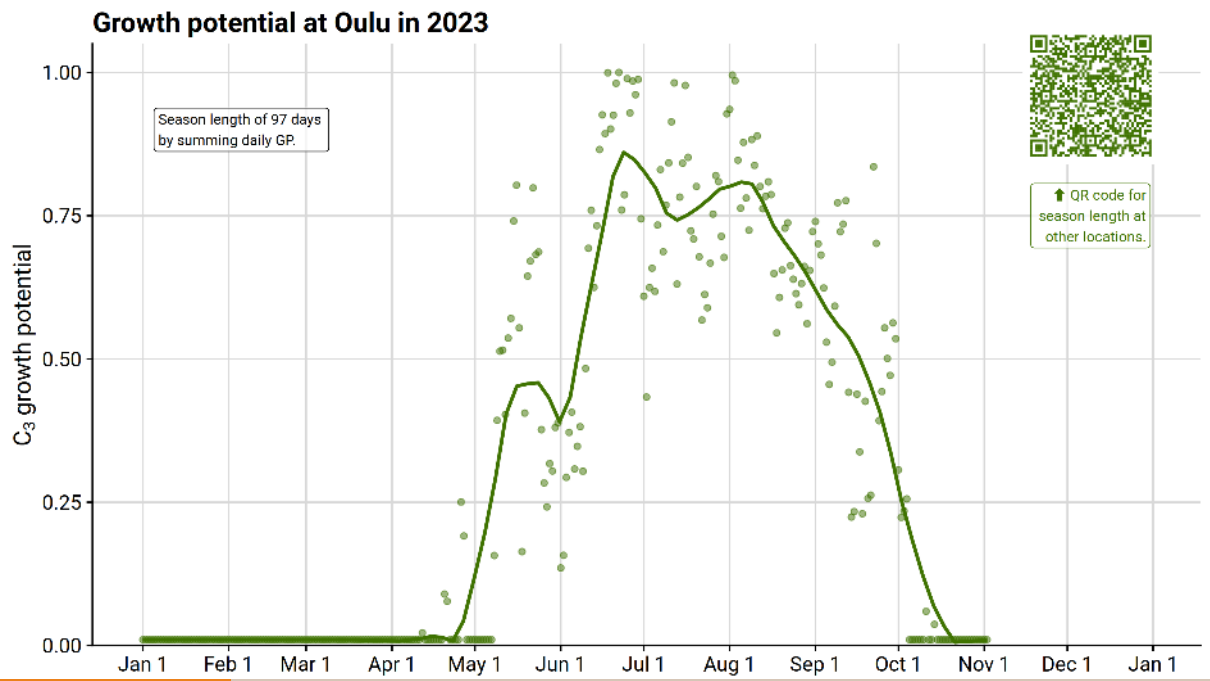
Expected clipping volume for Hirsala Golf in 2023

based on a growth ratio of 0.5



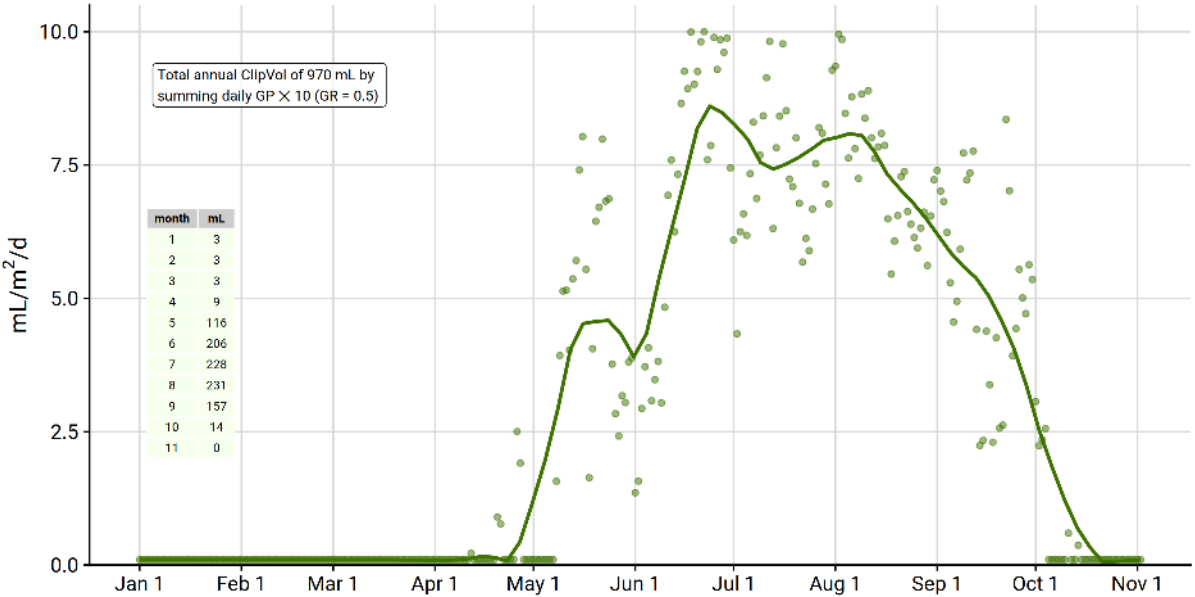
month	mL
1	3
2	3
3	3
4	38
5	134
6	227
7	245
8	255
9	210
10	45


Daily temperature summary in 2023
Oulu
Air temperature, °C
30
20
10
0
-10
-20
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1

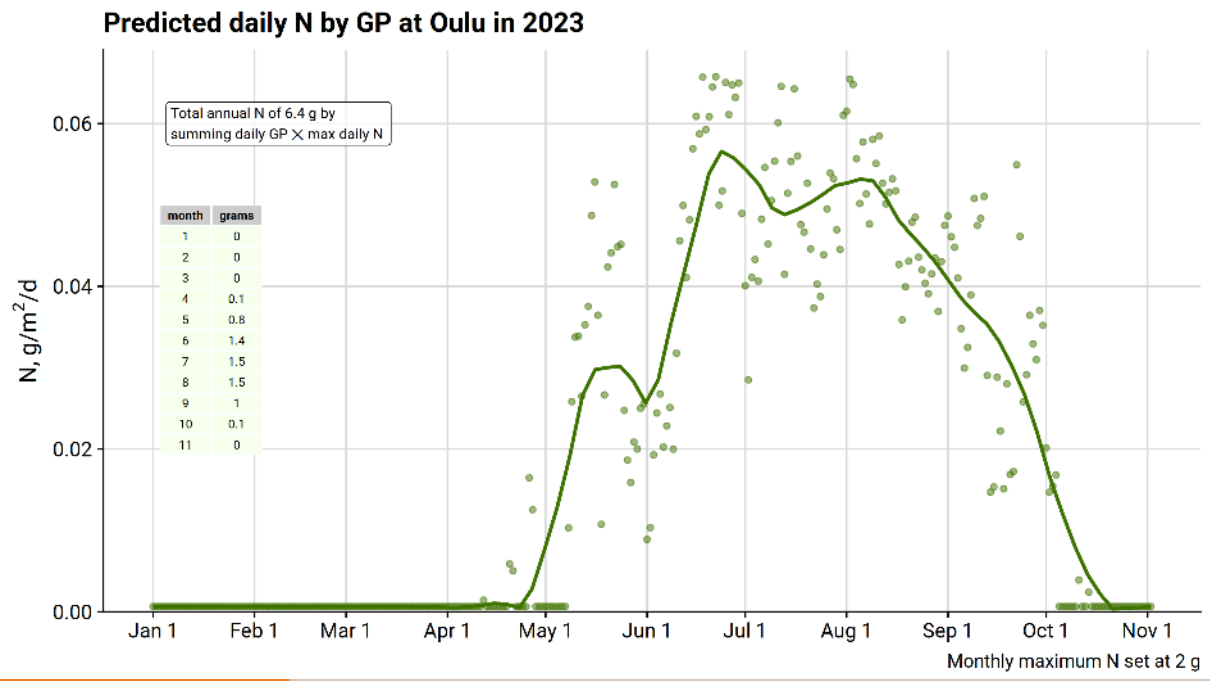

Growth potential at Oulu in 2023
Season length of 97 days by summing daily GP.
QR code for season length at other locations.
C_3 growth potential
1.00
0.75
0.50
0.25
0.00
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Dec 1
Jan 1

Expected clipping volume for Oulu in 2023

based on a growth ratio of 0.5



month	mL
1	3
2	3
3	3
4	9
5	116
6	206
7	228
8	231
9	157
10	14
11	0


Predicted daily N by GP at Oulu in 2023
Total annual N of 6.4 g by summing daily GP × max daily N
month grams
1 0
2 0
3 0
4 0.1
5 0.8
6 1.4
7 1.5
8 1.5
9 1
10 0.1
11 0
N, g/m2/d
0.00
0.02
0.04
0.06
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Monthly maximum N set at 2 g

Two types of organic matter measurements

The definition of soil organic matter

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

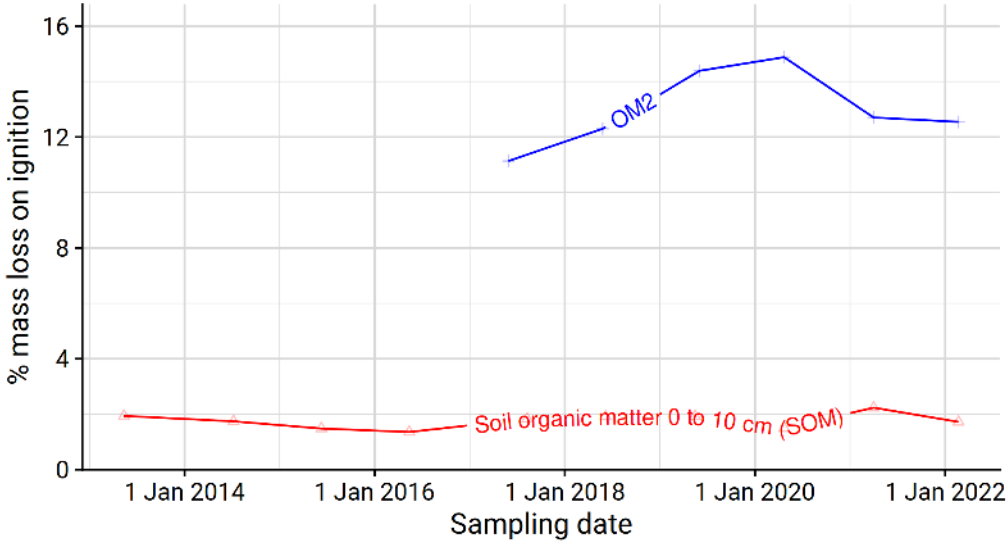
humus: the well decomposed, more or less stable part of the organic matter in mineral soils.

Total organic material

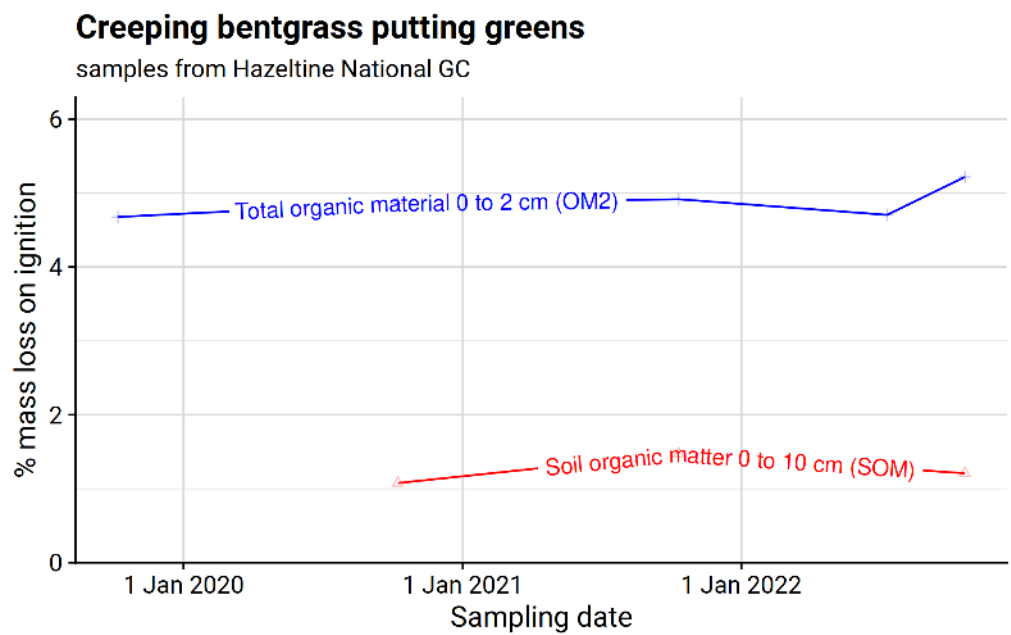
total organic material: organic material in a soil sample that has not passed through a sieve. This test is conducted on the sample as it is received at the laboratory, with no removal of living or dead plant material prior to testing.

Zoysia (korai) putting greens

samples from Keya GC



All soil tests conducted at Brookside Labs


Creeping bentgrass putting greens
samples from Hazeltine National GC
% mass loss on ignition
6
4
2
0
Total organic material 0 to 2 cm (OM2)
Soil organic matter 0 to 10 cm (SOM)
1 Jan 2020
1 Jan 2021
1 Jan 2022
Sampling date
All soil tests conducted at Brookside Labs

What happens at the laboratory


BROOKSIDE
LABORATORIES INC.
EST. 1951
WWW.BLINC.COM
BROOKSIDE

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


LINDBERG/BLUE M
PV
18
SP
440
AL 1
OUT
UT150
SET/ENT

Basic use of OM246 test results

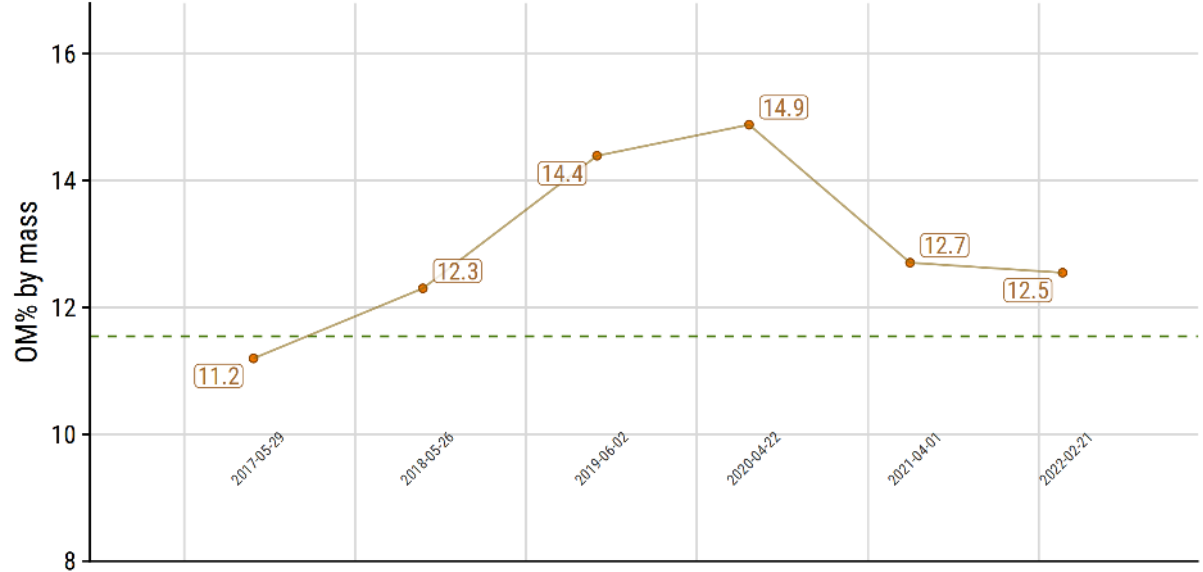
If the surfaces have just the right firmness level and hold the right amount of water, then I want the total organic material to stay the same over time, and I can adjust the sand topdressing and other organic material management work accordingly.

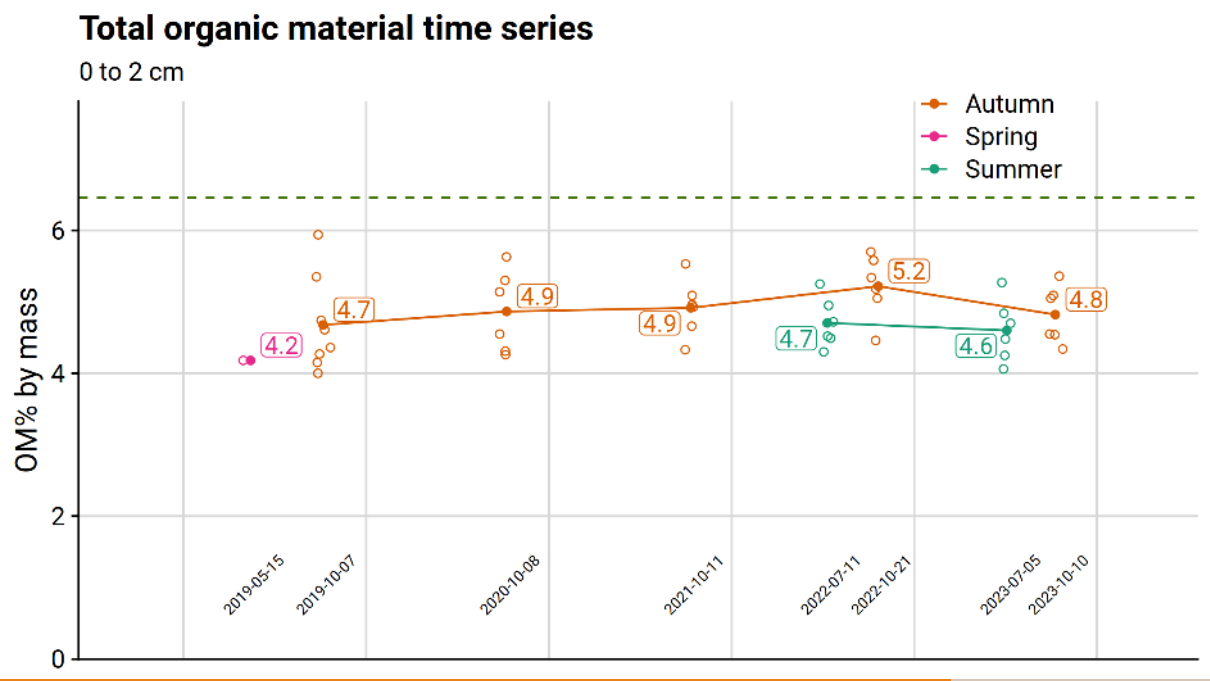
If the surfaces are too soft, or hold too much water near the surface, and I would like them to be firmer in the future, then I want to see the total organic material decrease over time, and I will increase the amount of sand topdressing and organic material management.

If the surfaces are too firm, or don't hold enough water near the surface, and I would like them to be softer in the future, then I want to see the total organic material increase over time. To do that, I will reduce the amount of sand topdressing and organic material management.

Total organic material time series

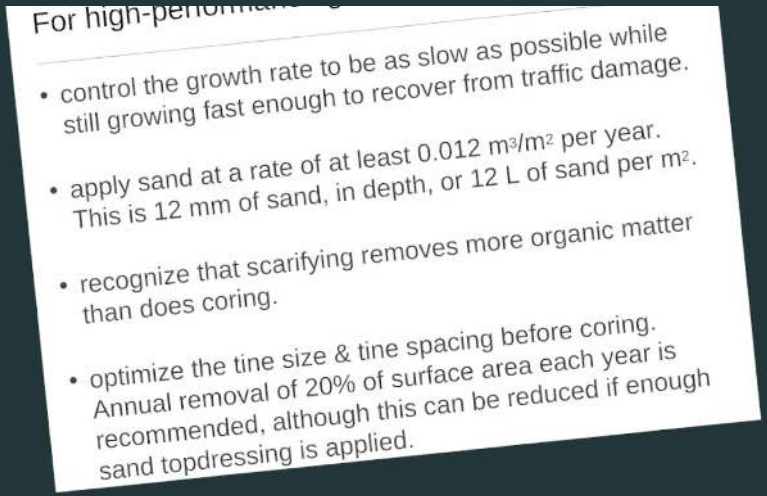
0 to 2 cm




Total organic material time series
0 to 2 cm
Autumn
Spring
Summer
OM% by mass
0
2
4
6
4.2
4.7
4.9
4.9
4.7
5.2
4.6
4.8
2019-05-15
2019-10-07
2020-10-08
2021-10-11
2022-07-11
2022-10-21
2023-07-05
2023-10-10

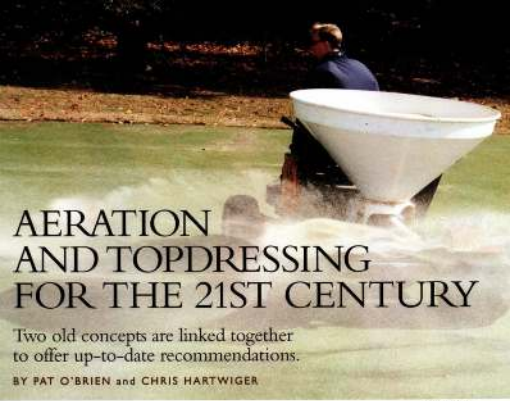
Sand topdressing

A slide from *my presentation* on OM management in March 2014



For high-performance

- 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.



AERATION AND TOPDRESSING FOR THE 21ST CENTURY

Two old concepts are linked together to offer up-to-date recommendations.

BY PAT O'BRIEN and CHRIS HARTWIGER

Putting green aeration and topdressing are literally and figuratively dirty words. Golfers begrudgingly accept the fact that to protect the long-term health of the grass on a putting green, it is necessary to aerate and topdress each year. With more sophisticated products and techniques, gone are the days when putting greens were aerated in the spring and fall and buried in a blanket of sand. But lost in the changes to these programs may be an incomplete understanding of how much aeration and topdressing are needed to protect the long-term health of the greens.

The long-term health of putting greens depends on maintaining sand as the primary medium. If organic matter accumulates beyond a reasonable degree, the physical benefits of sand are diminished and putting green physical properties decline along with the health of the turf. For too long golf courses have been making changes in their aeration and topdressing programs without comparing these changes to a standard or target level. A previous *Green Section Record* article titled "Core Aeration by the Numbers" detailed how tine size and spacing affects the amount of surface area impacted by an aeration treatment and made a recommendation to impact 15-20% of the surface each year (O'Brien and Hartwiger, 2001). This recommendation did not go far enough because it did not include surface topdressing applications, which go hand in hand with core aeration in diluting organic matter accumulation. This article expands upon these concepts and links core aeration and sand topdressing.

Using dry sand and the proper topdressing equipment improves worker productivity and helps reduce golfer complaints.

THE SIGNIFICANCE OF CORE AERATION AND SAND TOPDRESSING

According to University of Georgia turfgrass researcher Dr. Bob Carrow, the number-one problem experienced on sand-based putting greens is the excessive accumulation of organic

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

> *“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.

CORE AERATION BY THE NUMBERS

Explaining the need for aeration is often easier if you use specific numbers.

by CHRIS HARTWIGER and PATRICK O'BRIEN

"To keep organic matter content below 3-4 percent in the upper rootzone, these articles recommend core aeration treatments that impact 15-20 percent of the putting surface each year and topdressing programs that incorporate at least 40-50 cubic feet of sand per 1,000 square feet annually."

Moeller & Lowe, 2016

That's 12 to to 15 mm of sand per year. That's 190 to 240 tons/ha per year.

Another recommendation

> *"Increasing sand topdressing frequency to every 7 to 14 days and applying at least 20.3 ft^3/1000 ft^2 topdressing sand annually, combined with routine soil cultivation to ensure sand incorporation, are practices that can be utilized to manage SOM."*[1]

That's 6 mm sand per year. That's 100 tons/ha per year.

[1]Schmid C.J., Gaussoin R.E., and S.A. Gaussoin. 2014. Organic matter concentration of creeping bentgrass putting greens in the continental U.S. and resident management impact. *Applied Turfgrass Science*.

Recommended approach

Check surface zone (0 to 20 mm) organic matter once a year

Then, compare the OM change to:

- annual N rate
- annual sand topdressing amount
- annual aerification impact

Slides & additional information

www.asianturfgrass.com

www.paceturf.org