Un système moderne de gestion du gazon adaptée à chaque site

Micah Woods

November 7, 2023

Asian Turfgrass Center
www.asianturfgrass.com

PACE Turf
www.paceturf.org

Plan de la conférence

3 thèmes principaux

- Gestion durable du gazon
- Choix des graminées
- Gestion du gazon et du sol

Plan de la conférence

7 chapitres

- Gestion durable du gazon
- Choix des graminées
- Conditions de jeu
- Croissance du gazon
- Eau
- Apport de nutriments
- Gestion de la matière organique

Gestion durable du gazon

Documenting your progress toward sustainability

These practical, science-based sustainability metrics can help you and your facility measure and communicate concrete progress toward reaching sustainability goals

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Micah Woods, Ph.D.

Sustainability. The word is getting a bad rap these days, and justifiably so, as it is used (and misused) for every purpose under the sun — from advertising chewing gum, to "greenwashing" environmentally damaging practices, to political campaigns and the workplace. Chances are, it even shows up in your own job goal documents. But how can you meet a goal of sustainability when its meaning has become so vague and diluted that a recent Google search on "define sustainable" yielded more than 28 million entries? How do you develop tactics, strategies and plans around an idea that no one can pin down? And how will you and your co-workers know how successful you've been without some system for measuring sustainability?

Without the ability to measure it, sustainability remains a murky, confusing and frustratingly unobtainable goal. Without quantification, evaluating the achievement of sustainability goals becomes wholly subjective — in the eye of the beholder. Although you may think you're doing a great job, you have no way to communicate it or to prove it, unless you have some way to measure and document it.

In this article, we present several simple monitoring approaches that can help take the mush out of sustainability, and instead treat it as a measurable, science-based agronomic phenomenon. All of these procedures can easily be put into practice at your facility.

The single biggest impact on sustainability: reducing turf acreage

Decreasing the number of highly maintained acres is without doubt the most effective way to increase sustainability by reducing almost all inputs — including water, pesticides, fertilizers, labor, energy and money. A recent *USGA Green Section Record* article (2) calculated savings of $1,700 to $7,000/acre/year in water use alone for golf courses in the southwestern U.S. that have implemented turf reduction projects. Depending on the situation, superintendents have converted out-of-play areas, tee surrounds, shady locations and other turf areas to native and/or low-maintenance vegetation, mulch, non-overseeded turf or other lower-upkeep replacements.

Superintendent Sandy Clark, CGCS, of Barona Creek Golf Club in California, reduced turf acreage by 12 acres (4.85 hectares), most notably by replacing overseeded bermudagrass tee surrounds with native vegetation.

Several useful software tools can provide a hard and fast quantification of turf acreage at the start of a turf reduction program, and periodically thereafter. Free applications, such as Google Planimeter (www.acme.com/planimeter/) can quickly obtain approximate measurement of turf acreage using satellite photos from Google Maps. For more precise measurements of acreage, a superintendent can purchase a geo-rectified aerial photograph of the course that can be used with one of many geographic information system software packages, or a company such as Course Vision can use ground-based GPS systems to survey and inventory a course, and produce detailed maps and measurements for the entire property.

Fertilizer inputs: How low can you go?

We have suspected for many years that most soil nutritional guidelines (including our own) overestimated the amounts of nitrogen, potassium, phosphorus and other key nutrients needed for turf health. The operating principle in most cases was a desire to ensure that there is never a deficit in soil nutrients. But as economic and environmental concerns have grown, the emphasis has shifted to targeting the lowest levels of soil nutrients that will provide turf performance that meets expectations. This may seem like a subtle shift in thinking, but it can have enormous impacts on sustainability, as shown below.

To find out how low we could really go in terms of soil nutrition, Pace Turf and the Asian Turfgrass Center pooled a huge database of more than 17,000 soil samples that had been collected from turf facilities over the past 20 years. Of these, we identified 1,500 samples that met our requirements (primarily that they were collected from areas where the turf was performing adequately), and then statistically analyzed the data to determine the lowest levels of each major nutrient that could predictably support good-quality turf.

The result was the Minimum Levels for Sustainable Nutrition (MLSN) soil guidelines (Table 1), which were introduced last year (4) and call for reductions of 50% or more in many key soil nutrients. Since that time, the guidelines have been adopted by turf managers around the world, many of whom have been pleasantly surprised at how low they could go in terms of soil nutrition without sacrificing turf quality or playability.

We believe that most superintendents can make significant reductions in the total nutrients applied at your location by using MLSN as a guide. To participate in the effort to identify more sustainable turf nutritional guidelines, read about the Global Soil Survey for Sustainable Turf (Page 82).

Measure total pounds and toxicity levels of pesticides applied

Reducing the total pounds or kilos of pesticides used is a good goal, but reducing the toxicity of the pesticides applied is equally important.

Determining the weight of pesticide (insecti-

[illegible] (2007) (top) were removed (bottom) and replaced with native vegetation (2008), a move that decreased the turf acreage and resulted in significant savings in water and fertilizer inputs. Photos by L. Stowell. Credits for Google Maps Images: 2007 – Image ©2013 Digital Globe, ©2013 MEDI, ©2013 Google; 2008 – Image U.S. Geological Survey, ©2013 MEDI, ©2013 Google.

Nous recommandons :

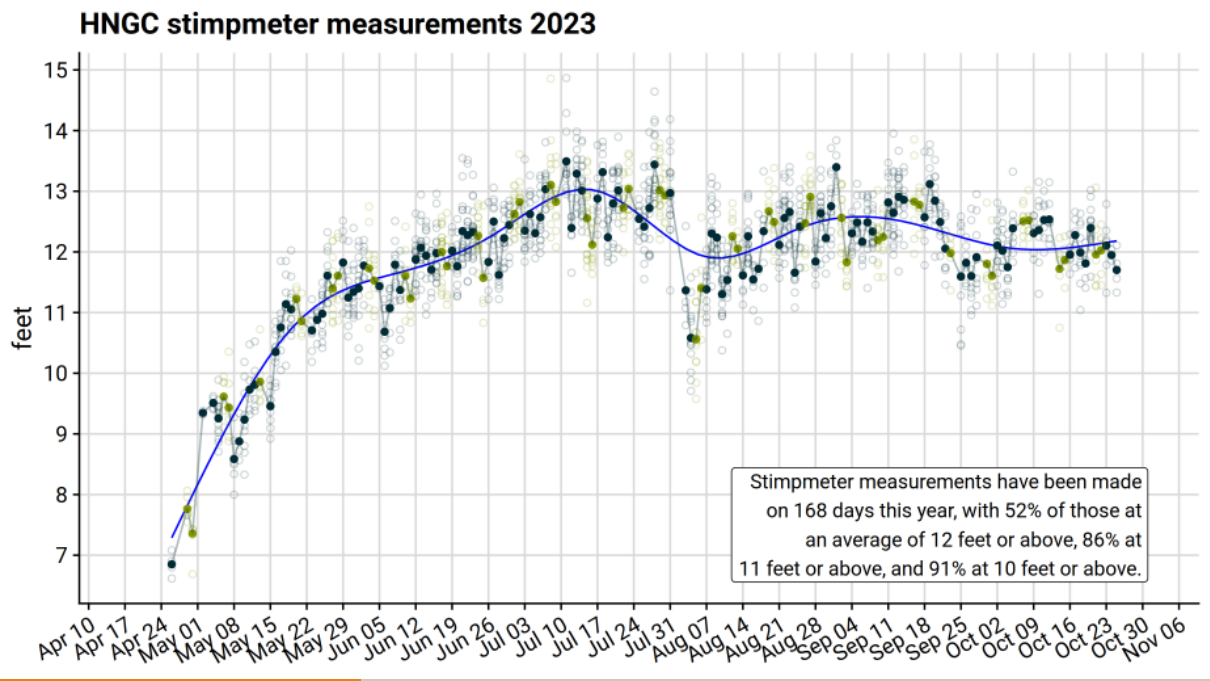
- Réduire la surface de gazon entretenue intensivement
- Enregistrer les apports d'engrais
- Enregistrer les applications de pesticides
- Enregistrer la consommation d'eau
- Enregistrer la consommation en carburant et son coût
- Enregistrer la consommation en électricité
- Enregistrer l'utilisation de sable

Choix des graminées


SRIXON
1


SRIXON
1

Conditions de jeu


HNGC stimpmeter measurements 2023
feet
15
14
13
12
11
10
9
8
7
Apr 10
Apr 17
Apr 24
May 01
May 08
May 15
May 22
May 29
Jun 05
Jun 12
Jun 19
Jun 26
Jul 03
Jul 10
Jul 17
Jul 24
Jul 31
Aug 07
Aug 14
Aug 21
Aug 28
Sep 04
Sep 11
Sep 18
Sep 25
Oct 02
Oct 09
Oct 16
Oct 23
Oct 30
Nov 06
Stimpmeter measurements have been made on 168 days this year, with 52% of those at an average of 12 feet or above, 86% at 11 feet or above, and 91% at 10 feet or above.

Mes recommandations

Evaluer les conditions de jeu au moins une fois par semaine

- Vitesse de la balle
- qualité de la roule (test de sautillement)
- fermeté de la surface[1]

[1] Mesurer l'humidité du sol en même temps, si vous disposez d'une sonde.

Mes recommandations

Comparer ensuite les résultats obtenus avec le niveau souhaité

Objectif : maximiser le nombre de jours dans l'année où les conditions de jeu atteignent le niveau souhaité

Croissance du gazon

Qu’est ce qui est influencé par la croissance du gazon?

- Réparation des divots
- Réparation des pitchs
- Besoins en eau
- Besoins en nutriments
- Certaines maladies
- Dégats liés au piétinement
- Vitesse des greens
- Fréquence des tontes
- Feutre (et tout ce qui est nécessaire à son contrôle)

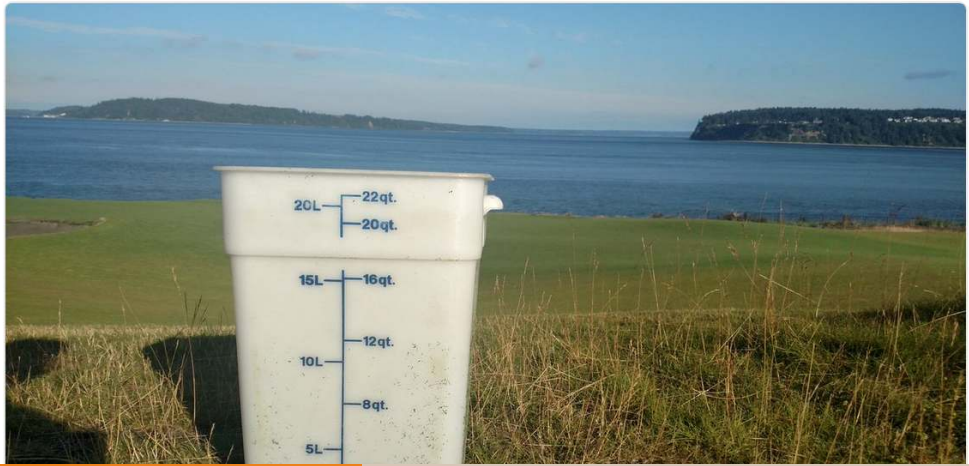

10
5


EX13
SUBARU
5

Eric Johnson
@altshot2

Following

Nice day for harvest. #MLSN



Manabu Taya
May 18 · Edited ·

1面この半量ぐらいでいきたい。
See Translation
— at メイフラワーゴルフクラブ.

Like Comment Share

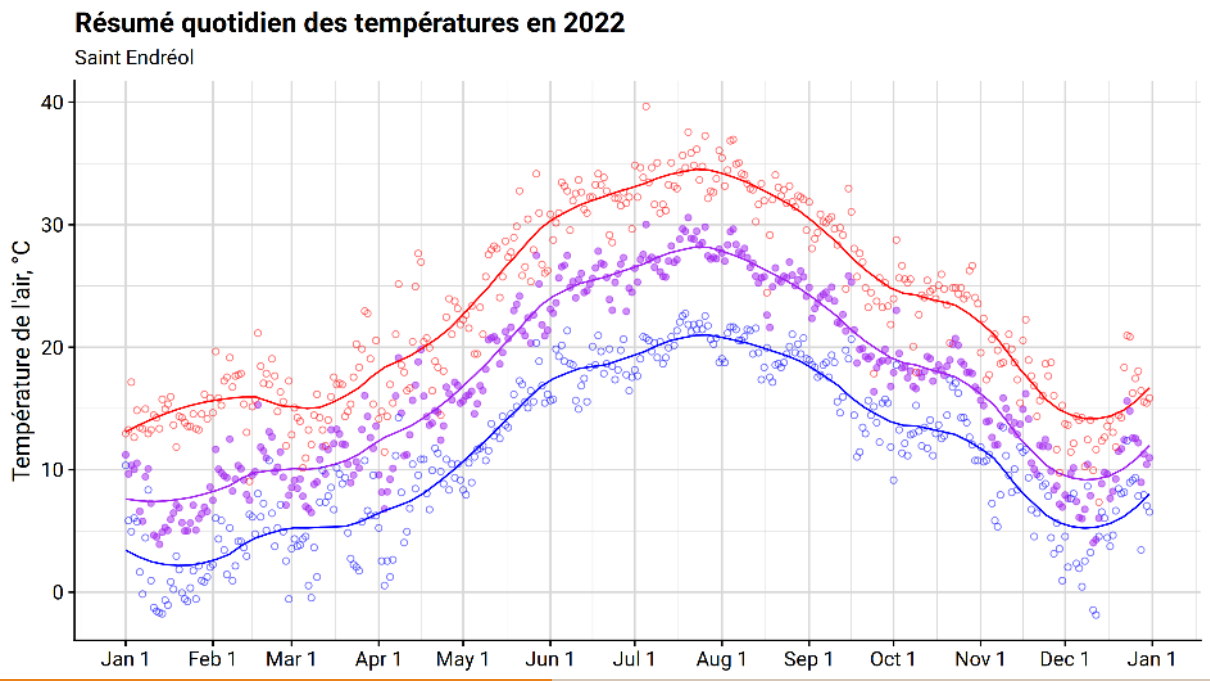
5

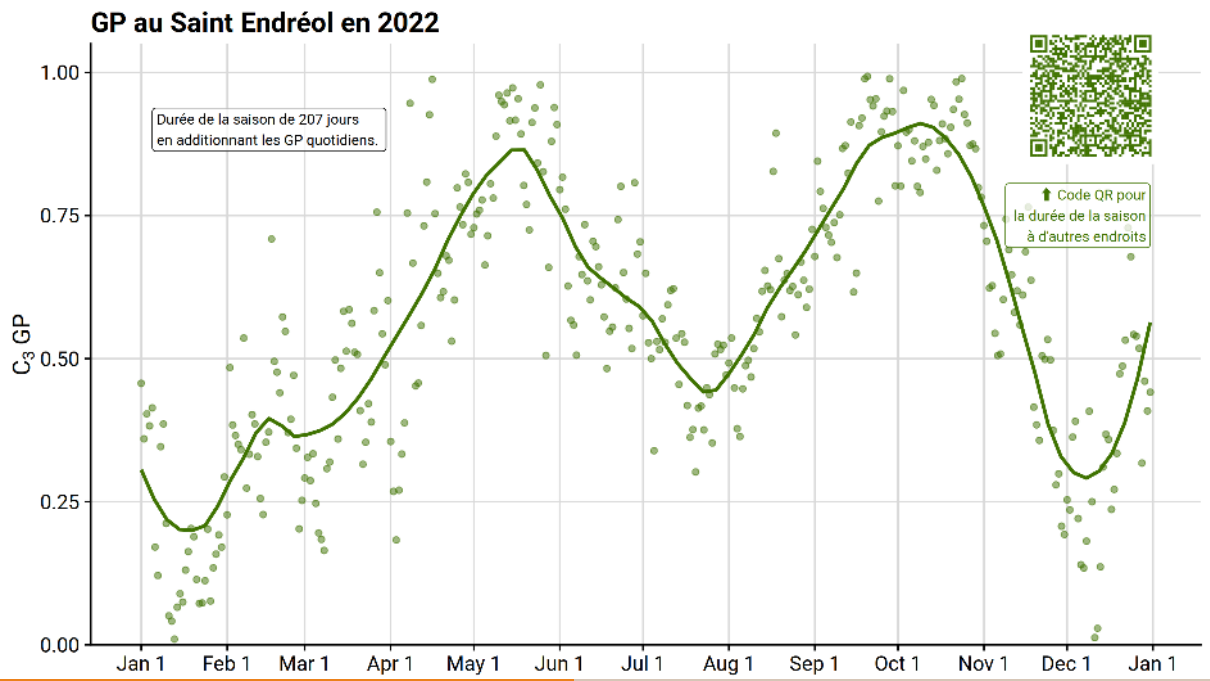
1 Share

Write a comment...

Exemples d'utilisation des données

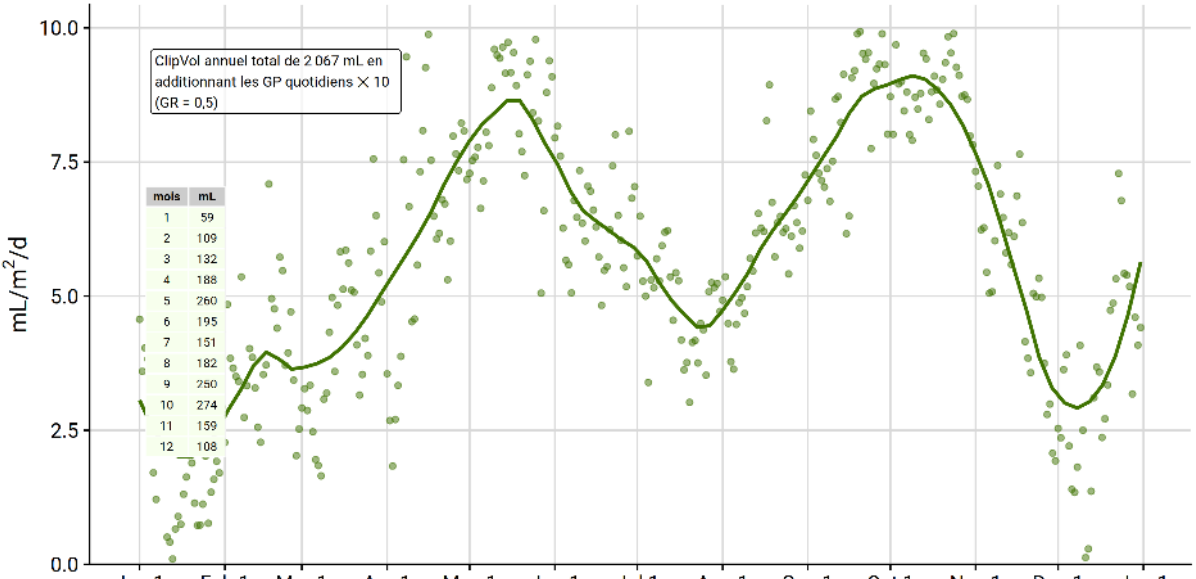
- Apport précis de nutriments basé sur la collecte des déchets de tonte
- Quand tondre à nouveau en se basant sur la croissance
- Effet des régulateurs de croissance
- Besoins en topdressing


Résumé quotidien des températures en 2022
Saint Endréol
Température de l'air, °C
40
30
20
10
0
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

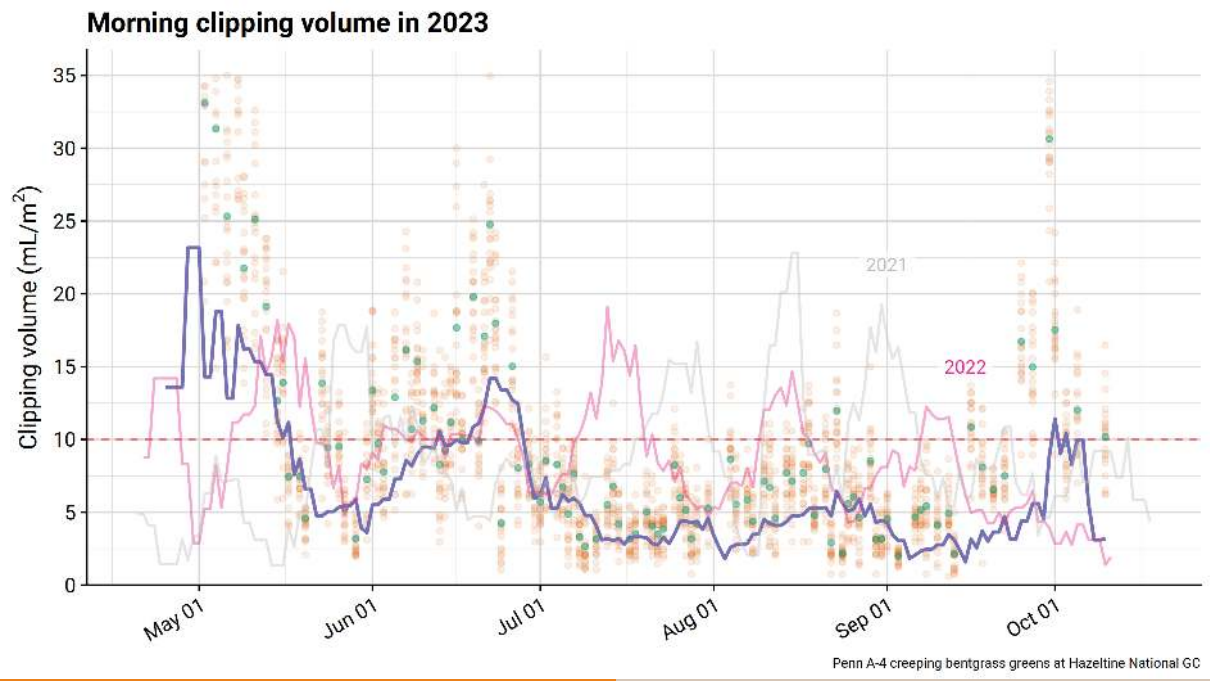

GP au Saint Endréol en 2022
Durée de la saison de 207 jours
en additionnant les GP quotidiens.
⬆ Code QR pour
la durée de la saison
à d'autres endroits
C_3 GP
1.00
0.75
0.50
0.25
0.00
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Dec 1
Jan 1

Volume de tonte attendu à Saint Endréol en 2022

sur la base d'un taux de croissance de 0,5



mois	mL
1	59
2	109
3	132
4	188
5	260
6	195
7	151
8	182
9	250
10	274
11	159
12	108


Morning clipping volume in 2023
Clipping volume (mL/m^2)
35
30
25
20
15
10
5
0
2021
2022
May 01
Jun 01
Jul 01
Aug 01
Sep 01
Oct 01
Penn A-4 creeping bentgrass greens at Hazeltine National GC

Eau

Siam CC Plantation Course, Thailand

- Minimiser la surface de gazon irrigué
- Choisir des graminées consommant moins d'eau
- Utiliser des sondes d'humidité
- Utiliser des mouillants
- Faire pousser le gazon lentement
- Favoriser un système racinaire profond
- Utiliser des pigments pour la couleur
- Enregistrer et analyser la consommation d'eau

Apport de nutriments

Large éventail de données obtenues sur des gazons performants

Prenez en compte 3 valeurs

1. Besoins prévus de la plante pour la période donnée
2. La quantité minimale pour conserver intactes les réserves du sol
3. Les résultats de l'analyse de sol actuel

$$\overbrace{a+b}^{\text{besoins}} - \overbrace{c}^{\text{quantité présente dans le sol}} = \overbrace{Q}^{\text{besoins en engrais}}$$

a est le besoin estimé de la plante pour le site
b est la valeur guide MLSN (NMND–Niveau Minimal pour une Nutrition Durable)
c est le résultat de l'analyse de sol

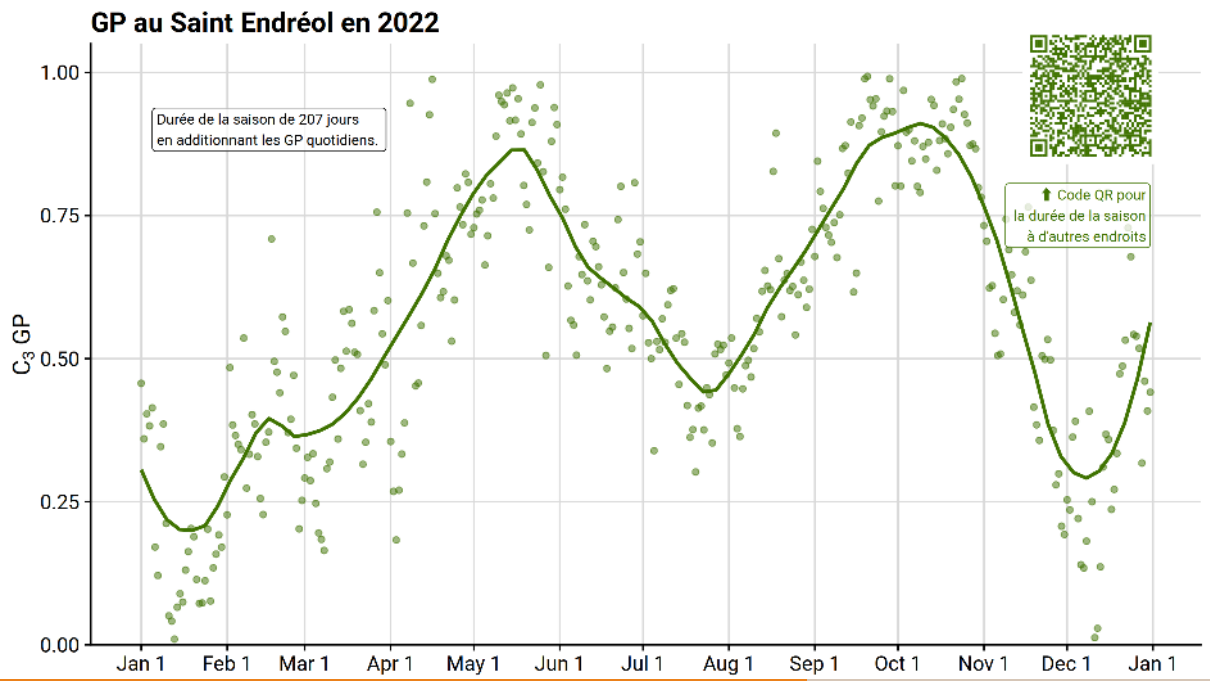

Soil test potassium on greens
Soil test K, mg/kg
80
60
40
20
0
MLSN minimum for K
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Potassium applied to greens
K applied, g/m^2
8
6
4
2
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year


Soil test phosphorus on greens
Soil test P, mg/kg
200
150
100
50
0
MLSN minimum for P
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Phosphorus applied to greens
P applied, g/m^2
0.8
0.6
0.4
0.2
0.0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

Apports totaux en 10 ans

Potassium 51 g/m^2

Phosphore 1.1 g/m^2


GP au Saint Endréol en 2022
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⬆ Code QR pour
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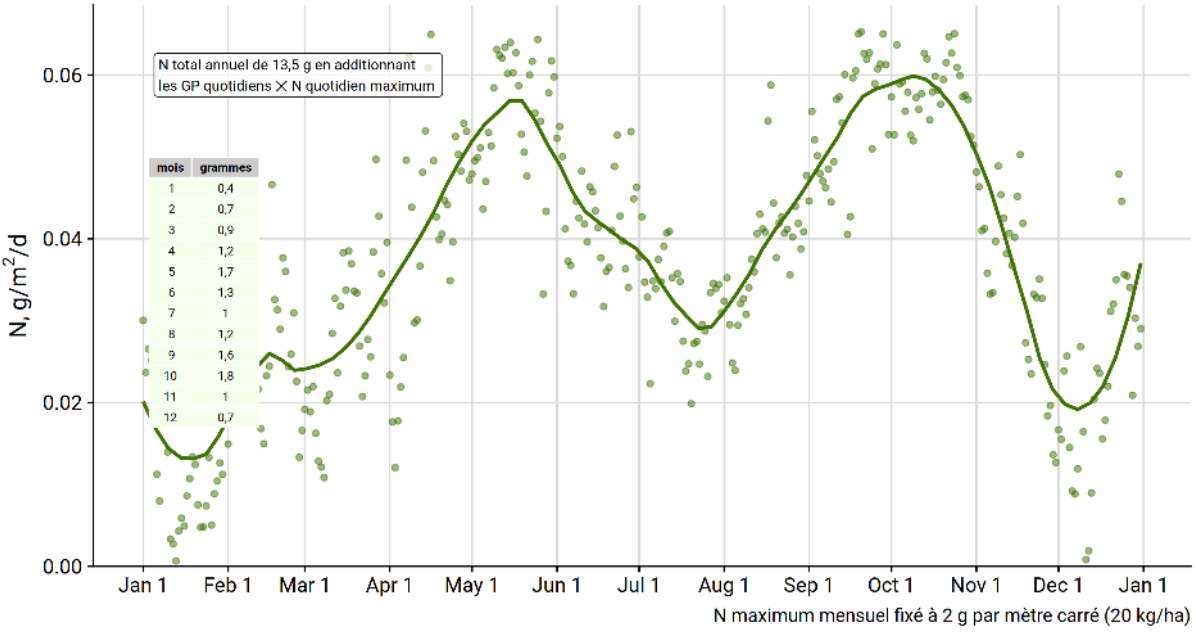
à d'autres endroits
C_3 GP
1.00
0.75
0.50
0.25
0.00
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
Nov 1
Dec 1
Jan 1

Prédit quotidiennement N par GP à Saint Endréol en 2022



Gestion de la matière organique

25 Juillet 2022 avec l'aimable autorisation de Chris Tritabaugh

Définition de la matière organique du sol

Matière organique du sol : fraction organique du sol à l'exclusion des résidus végétaux et animaux non décomposés. Voir aussi humus

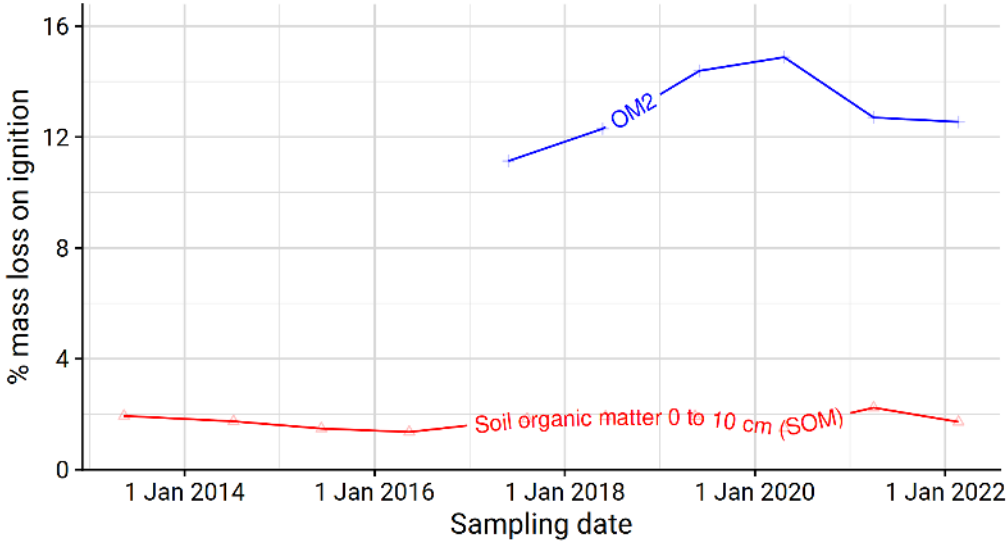
Humus : fraction bien décomposée, plus ou moins stable de la matière organique dans les sols minéraux

Matière organique totale

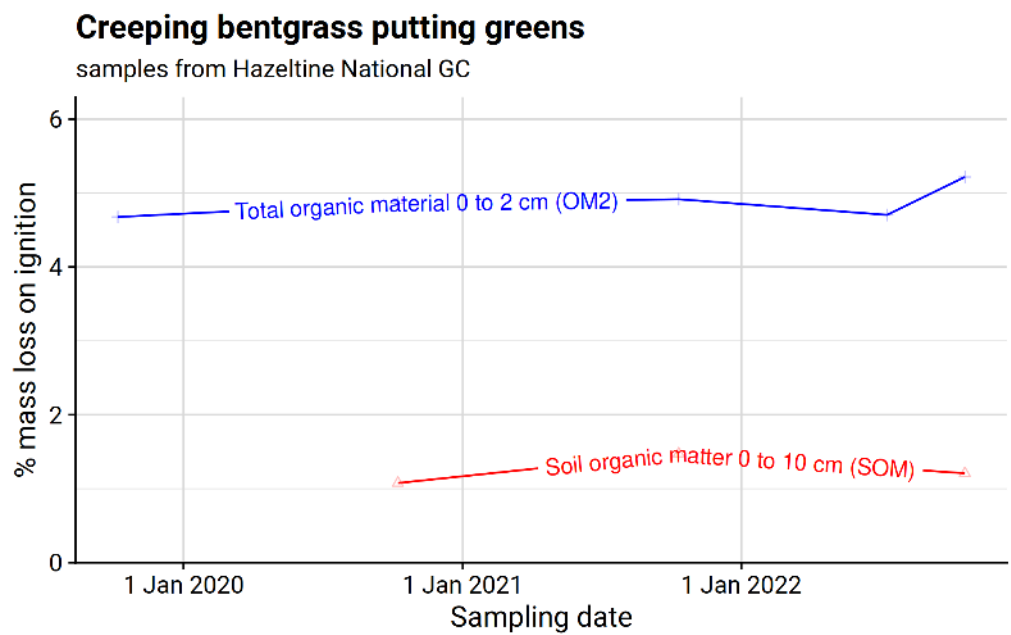
Matière organqiue totale : matière organique présente dans un échantillon de sol qui n'a pas été tamisé. Ce test est effectué sur l'échantillon tel qu'il est reçu au laboratoire, sans retirer les résidus végétaux, vivants ou morts

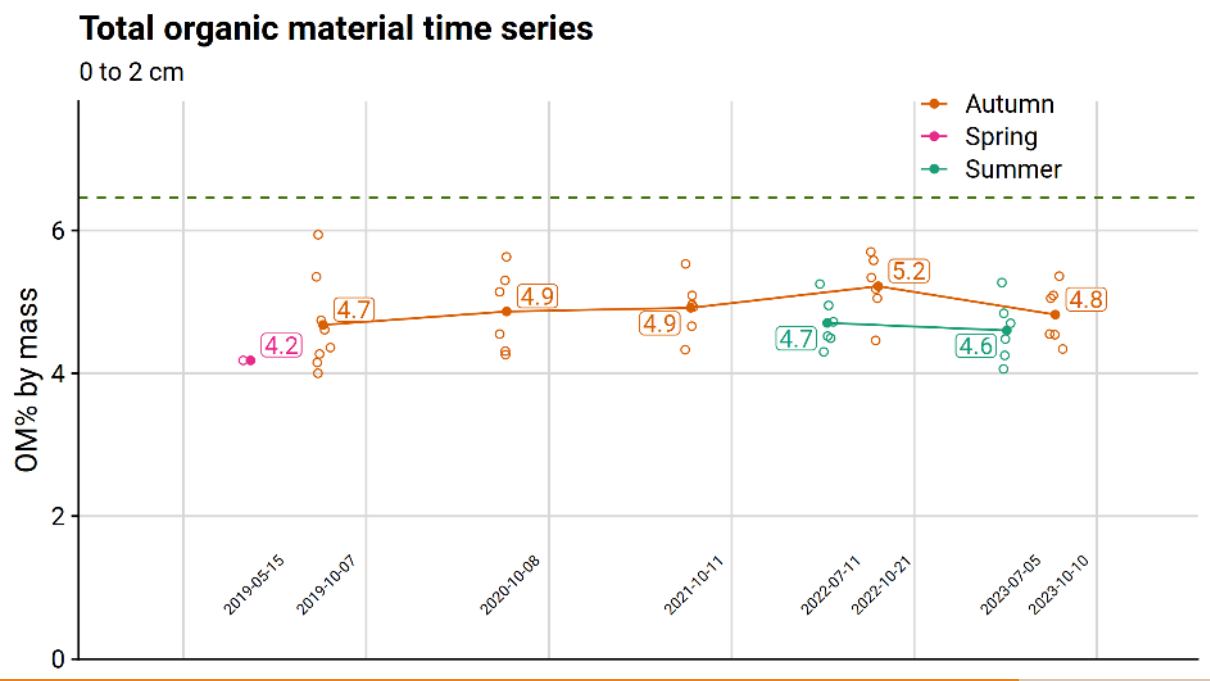
Zoysia (korai) putting greens

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


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

Au laboratoire

www.asianturfgrass.com

www.paceturf.org