

MLSN after 5 years: soil test interpretation for turfgrass today

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3. Using MLSN

Conventional guidelines are *broken*

Objective of greenkeeping



The Old Course, St. Andrews

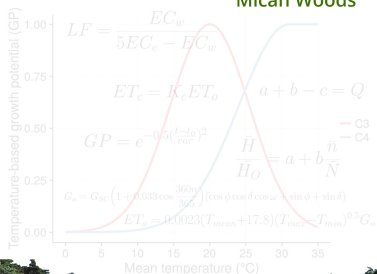
“Greenkeeping is managing the growth rate of the grass to create the desired playing surface for golf.” – *Micah Woods*

Short Grammar of Greenkeeping

A Short Grammar of Greenkeeping

Fundamental principles influencing turfgrass growth and maintenance

Micah Woods



“The fundamental principle of successful greenkeeping is the recognition of the fact that the finest golfing grasses flourish on poor soil and that more harm is done by over-, rather than underfertilizing.” – *Alister MacKenzie*

Greenkeeping, or agronomy?



“In some cases, turfgrasses have been placed in a ‘high’ P and K requirement category, while pasture grasses were in a ‘low’ category. This decision was based on economics, not agronomics. The cost of fertilization was not considered of primary importance for turf.” –
Carrow, Waddington, and Rieke

And grass is often grown in sand



“Turfgrass researchers continue to improve the soil testing recommendations, but that type of research is time consuming and expensive. It is also worth noting that every time a researcher conducts one of these studies, they tend to find that the levels required are lower than what we previously thought – meaning that ‘low potassium’ you got on your last soil test report might be optimum down the road.” –

Doug Soldat

The MLSN guidelines address these problems

“I recommend you compare your results with PACE Turf’s Minimum Levels for Sustainable Nutrition [MLSN] guidelines ... the minimum levels published by PACE are drastically lower than many traditional soil test interpretations, and likely more accurate.” – *Doug Soldat*

The MLSN guidelines address these problems

Reference

September, 2014

Minimum Levels for Sustainable Nutrition Soil Guidelines

The Minimum Level for Sustainable Nutrition (MLSN) Guideline is a new, more sustainable approach to managing soil nutrient levels that can help you to decrease fertilizer inputs and costs, while still maintaining desired turf quality and playability levels. The MLSN guidelines were developed in a joint project between PACE Turf and the Asian Turfgrass Center. All soil analyses were conducted at Brookside Laboratories, New Bremen, OH.

	MLSN Soil Guideline
pH	>5.5
Potassium (K ppm)	37
Phosphorus (P ppm)	21
Calcium (Ca ppm)	331
Magnesium (Mg ppm)	47
Sulfur as sulfate (S ppm)	7

Nitrogen requirements are best determined based on **turf growth potential**, which incorporates site-specific weather and turf type to calculate nitrogen demand (Gelernter and Stowell, 2005. Golf Course Management, p. 108-113, March, 2005).

How the guidelines were developed

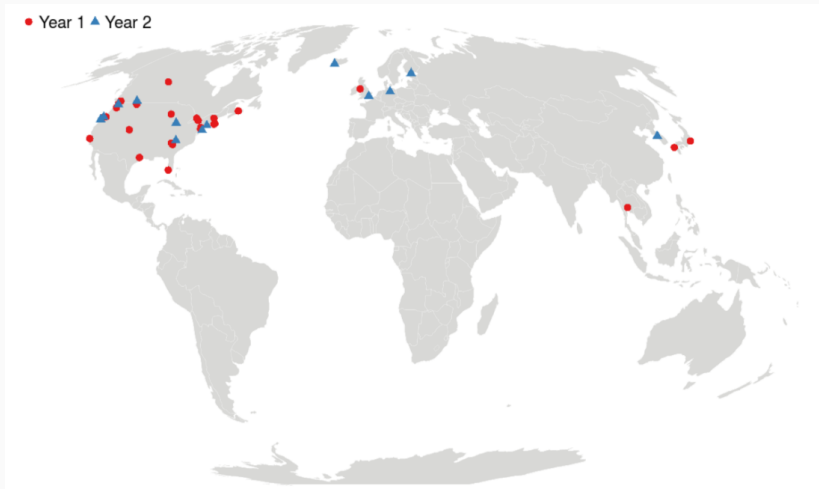
From a database of over 17,000 soil samples, we selected 3,721 that were classified as having:

- not poor performing turfgrass
- pH 5.5 - 8.5 to avoid aluminum toxicity
- total exchange capacity <6 cmol/kg

A log-logistic model provided a significant fit of the data, and was used to identify the concentration (in ppm) of each nutrient that 10% of the soil samples fell below, but were still performing well. This 10th percentile value is the MLSN soil guideline shown above.

For more information, see the Facebook MLSN page at: www.facebook.com/misnturf

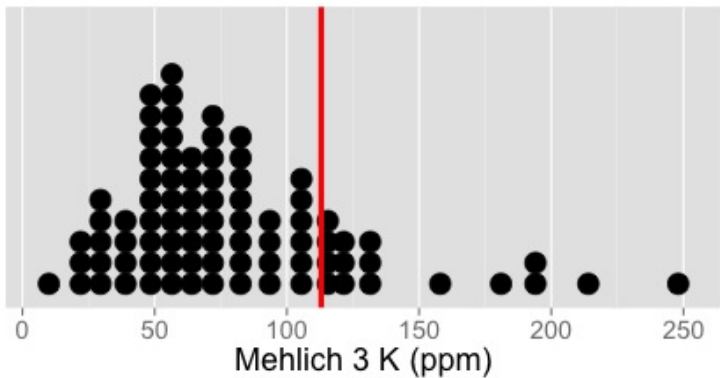
Global Soil Survey



Soil samples from good-performing turf



Soil samples from good-performing turf



Using MLSN

Let's make sure we have enough apples



More specifically...

One can express the quantity of an element required as fertilizer as Q .

$$a + b - c = Q$$

where,

a is the quantity of the element used by the grass

b is the quantity of the element kept in the soil

c is the quantity of the element present in the soil

Q is the quantity of the element required as fertilizer

MLSN is a value for b

$$\begin{array}{ccccc} \text{amount needed} & & \text{amount present} & & \text{fertilizer requirement} \\ \underbrace{a + b} & - & \underbrace{c} & = & \underbrace{Q} \end{array}$$

a is a site-specific use estimate, b is the MLSN guideline, and c is the soil test result.

Recommended viewing

1. How to prevent nutrient deficiencies AND use less fertilizer

2. How green is the grass? 1. Assess soil fertility 2. Assess soil moisture 3. Assess soil pH 4. Assess soil texture 5. Assess soil color 6. Assess soil temperature 7. Assess soil organic matter 8. Assess soil nutrient levels

3. To prevent deficiencies, ensure the grass has a regular supply of all the 16 NPK elements

4. The green grass is the goal

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<http://www.blog.asianturfgrass.com/fertilizer/>