

MLSN: modern turfgrass nutrition

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Asian Turfgrass Center
www.asianturfgrass.com

PACE Turf
www.paceturf.org

Fertilizer is the number one management tool. It is worth all the attention you can give it.

John Madison, *Principles of Turfgrass Culture* (1971)

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, The Spirit of St. Andrews (1995)

The conventional way – low,
medium, & high classification

The conventional way

RESEARCH

Clarifying soil testing: III. SLAN sufficiency ranges and recommendations

Given correct soil test results and the knowledge to interpret them, superintendents can determine proper amounts of nutrients to add to soils for healthy turf.

R.N. Carrow, Ph.D.; L. Stowell, Ph.D.; W. Gelernter, Ph.D.;
S. Davis; R.R. Duncan, Ph.D.; and J. Skorupski, M.S.

EDITOR'S

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It is a common misconception that the recommendations for the rate of application of fertilizer are based on the interpretation of the fertilizer response to the quantity and chemical SLAN (sufficiency level of soil) of various approaches to soil testing. We discussed the importance of using a representative approach to the soil conditions in a given field to determine the appropriate fertilizer rate. In this article we discuss acceptable sufficiency levels for macro-nutrients, differences between soil conditions of different soils and soil test results.

Review of SLAN approach

Classical soil testing is the SLAN approach to soil testing that screens the quantity of a nutrient within a field. The value of a nutrient available to the plant in the growing state is measured by analysis of soil water "up to" a given soil depth. For example, a soil sample from a sand grass, that is, soil with a 1:1 cation exchange capacity (CEC) of 10 meq/100 g soil and 20 parts per million (ppm) of 200-µg/kg available phosphorus. The soil nutrient level would be 200 ppm and 200 ppm.



Figure 1. Two different soil test methods (classical and SLAN) are used to determine the appropriate fertilizer rate for a given field.

amount that is needed to maintain the plant. Various soil fractions are used to determine the amount of a nutrient available to the plant.

KEY points

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- **Classical interpretation of data from soil test reports is important.**
- **Separation of data from the nutrient and the nutrient available to the plant is important.**
- **Classical soil test results are based on the amount of a nutrient available to the plant.**
- **SLAN soil test results are based on the amount of a nutrient available to the plant.**

plant available nutrients are used in the conventional approach.

Separation of data from the nutrient and the nutrient available to the plant is important. In the SLAN approach, the nutrient available to the plant is measured by analysis of soil water "up to" a given soil depth. For example, a soil sample from a sand grass, that is, soil with a 1:1 cation exchange capacity (CEC) of 10 meq/100 g soil and 20 parts per million (ppm) of 200-µg/kg available phosphorus. The soil nutrient level would be 200 ppm and 200 ppm.

List of ranges

- low
- medium
- high

“Low range: a high probability (80-100%)
that applying the nutrient will elicit a
growth response.”

“Medium range: approximately a 50% chance of getting a plant growth response ...; if supplemental fertilizer is not applied, growth will probably be limited, especially as the season progresses.”

“High range: little or no crop response is expected from applying the particular nutrient.”

Typical snapshot soil report

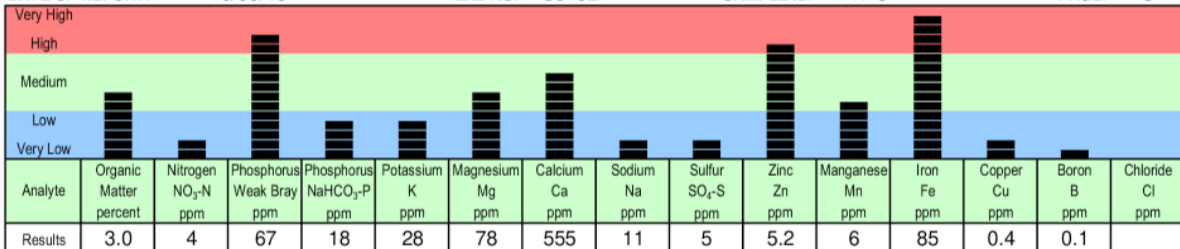
Graphical Soil Analysis Report

DATE OF REPORT: 10/05/18

LAB NO: 56182

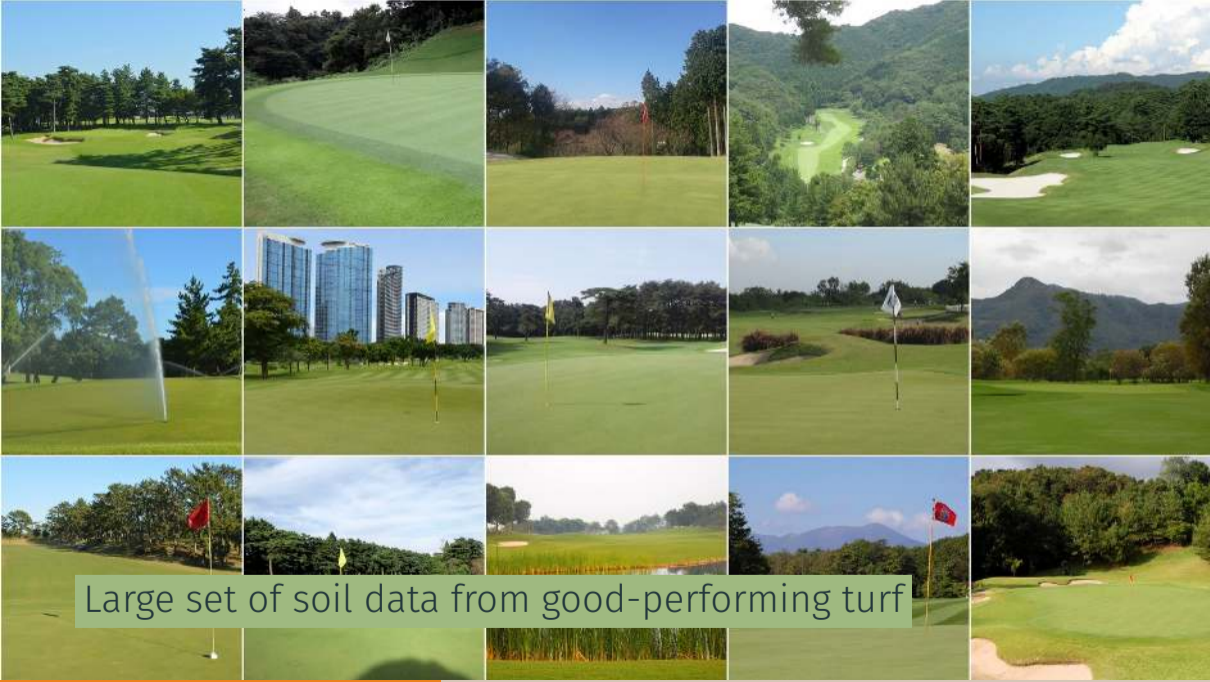
SAMPLE ID: FW-3

PAGE: 3



“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*

What MLSN is



Large set of soil data from good-performing turf

MLSN is an initialism for **M**INIMUM **L**evels for **S**ustainable **N**utrition.

MLSN is a modern method for using soil test results to make nutrient (fertilizer) recommendations for turfgrass.

How to use MLSN

Use three numbers

1. Expected plant use for the recommendation time period
2. MLSN minimum to keep untouched in the soil
3. Soil test result right now

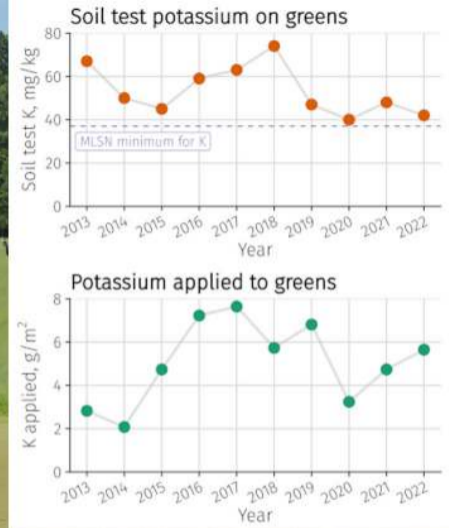
$$\begin{array}{ccccccc} \text{amount needed} & & \text{amount present} & & \text{fertilizer requirement} \\ \underbrace{a + b} & - & \underbrace{c} & = & \underbrace{Q} \end{array}$$

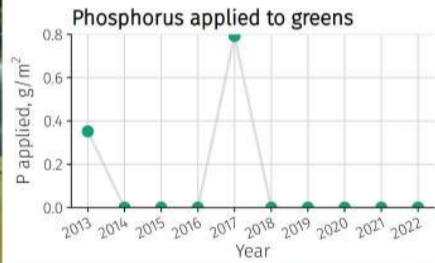
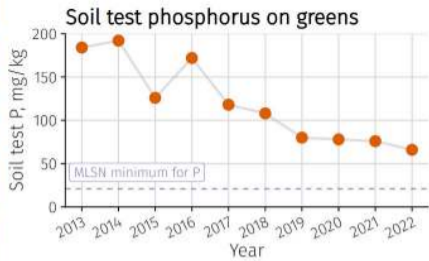
a is a site-specific estimate of plant use

b is the MLSN guideline

c is the soil test result

Why MLSN works





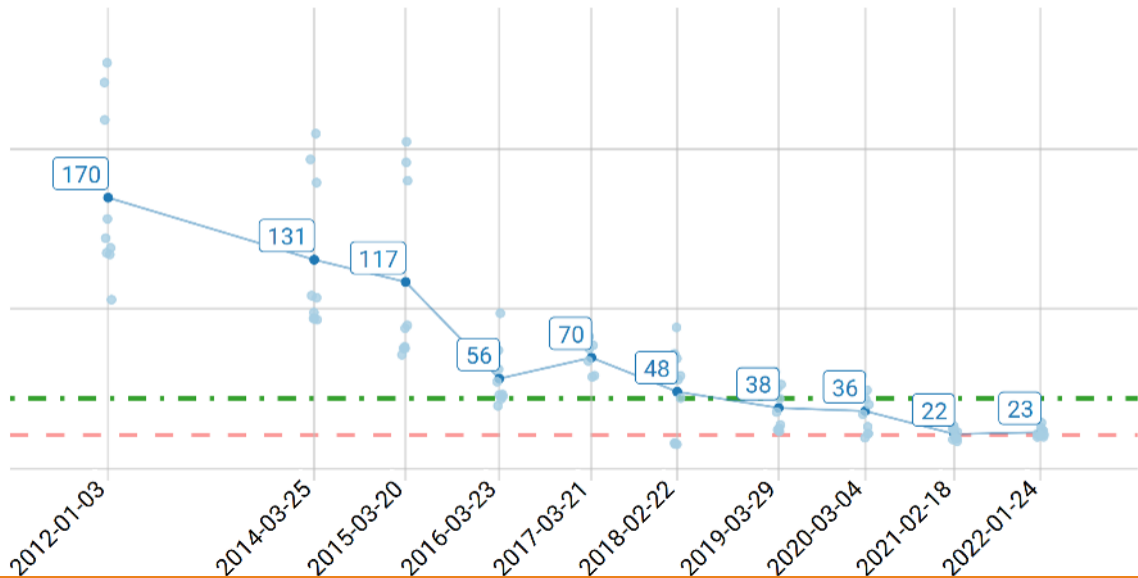
Total applied in 10 years

Potassium 51 g/m²

Phosphorus 1.1 g/m²

Phosphorus (P)

mg/kg



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