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Turf Grass TRENDS

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Keys to good soil chemistry: pH and nutrient ions

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FROM A PRACTICAL TURFGRASS MANAGEment standpoint, the complex world of soil chemistry boils down to the study of two subjects: **relative acidity or alkalinity of the soil** (its pH) and **plant nutrient ions.**

Measured on a scale 1 to 14 with 7 representing neutral, pH determines the availability of plant nutrient compounds in the soil. Turfgrass plants must compete for nutrients in an environment of natural and manmade factors that can work both for and against the plants at each particular site.

Most turfgrass managers may not think of themselves as ion farmers, but even "naked-eye" practice is based on moving huge numbers of tiny packets of beneficial nutrients down through the underlying layers of macroscopic, microscopic and chemical compound levels down to atomic level. Soil chemistry makes that level visible—so the fundamental features and factors stand out—and field analysis and decisions can be based on scientifically determined facts. To be sure, there are complexities that need untangling: how nutrient ions react to each other and to the full range of forces at work in the primordial soup that we call soil and, most importantly, how their characteristics and activities affect the survivability of turfgrass plants. But the reward is that managed turf, whether it is maintained at low, medium or high levels, always benefits from good soil chemistry.

The soil acts as both the physical anchor for turfgrass plants and as a reservoir of naturally occurring and supplementally applied plant nutrients. These elements, the basic building blocks of plant tissues, are often held in the soil matrix in forms that cannot be readily used by the plants. They are "fixed" in unavailable forms and only become available through the effects of the forces of weather, degradation and decomposition.

Turfgrass managers, armed with an understanding of soil chemistry and how it affects plant health and growth, represent a powerful force for improving turfgrass performance.

What are the essential plant nutrients?

TO SURVIVE, turfgrasses require sixteen essential nutrients—in various concentrations and amounts. The relative importance of each nutrient in plant development and survival can be gauged by their grouping as—**macronutrients and micronutrients** *(see chart below).*

– continued on page 3

Essential plant nutrients

Elements	Available Forms & Ion Charges
Macronutrients	
Carbon (C)	$CO_2^=$, $CO_3^=$
Hydrogen (H)	H^+
Oxygen (O)	Many forms
Nitrogen (N)	NH_4^+, NO_3^+
Phosphorus (P)	$HPO_4^=$, $H_2PO_4^-$
Potassium (K)	K^+
Sulfur (S)	$SO_4^=$
Calcium (Ca)	Ca^{++}
Magnesium (Mg)	Mg^{++}
Micronutrients	
Iron (Fe)	Fe^{++}, Fe^{+++}
Manganese (Mn)	Mn^{++}
Boron (B)	$H_2BO_3^-$
Copper (Cu)	Cu^{++}
Zinc (Zn)	Zn^{++}
Molybdenum (Mo)	$MoO_4^=$
Chlorine (Cl)	Cl^-

IN THIS ISSUE