

Micronutrients in Sports Turf

by Dr. Kent Kurtz

Turfgrasses need a total of 16 essential nutrients for healthy growth and development. Three of these essential nutrients—carbon, oxygen and hydrogen—are derived from the air or are found in water and are beyond the control of the sports turf manager.

The 13 remaining elements either come from the soil or are added by the sports turf manager through the addition of fertilizer materials. These 13 elements are further divided into macronutrients, which include the primary elements such as nitrogen,

phosphorus and potassium, and the secondary elements calcium, sulfur and magnesium.

The remaining elements are known as micronutrients, which consist of iron (Fe), zinc (Zn), boron (B), manganese (Mn), copper (Cu), calcium (Ca), chlorine (Cl) and molybdenum (Mo). These elements are required by the grass plant in minute or trace amounts, but they are very important to the health and vigor of turfgrasses on sports fields. The key to plant-availability is the soil pH; however, other factors may control

the availability of micronutrients, such as the type of soil-sand versus clay or loam, or the source of irrigation, domestic or reclaimed water.

Most micronutrients are available at a neutral pH and decrease as the soil pH becomes more alkaline (over 7.0). However, micronutrient availability increases as the soil pH becomes more acidic and these micronutrients may become extremely toxic to plants below 6.0.

Determining Micronutrient Availability/Deficiency

There are three ways that micronutrients can be assessed for availability in turfgrasses and soils: Chemical soil analysis, plant tissue analysis and through observation of the sports field or turfgrass area. Soil analysis is not always accurate since tests may reveal unavailable forms along with available forms. Tissue analysis will reveal the content in the plant at that particular moment while observation by the sports turf manager may not provide a true picture or pinpoint the exact element because some elements do not exhibit visual signs or may be masked by other factors.

Most Common Micronutrients

Micronutrients are used by plants in very small amounts but are just as essential for plant growth as large amounts of the primary and secondary nutrients. Micronutrients must be maintained in balance for all nutrients and water to be used efficiently in turfgrasses on sports fields. According to most experts, there are three micronutrients that are necessary to maintain green color and plant vigor in turfgrass plants. The most frequently used micronutrient and one that is contained in many fertilizer formulations is iron. The other two micronutrients that are essential are zinc and manganese.



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Iron

Iron is required by the plant cell in the formation of chlorophyll, which provides the plant with a healthy, green color. Iron also serves as a catalyst for biological processes such as respiration, symbiotic fixation of nitrogen

and photosynthesis. Applications of iron either through the leaf or applied to the soil may be temporary in soils with high levels of calcium. This condition is known as lime-induced iron chlorosis and can be corrected with applications of elemental sulfur

and/or acidifying fertilizers containing ammonium. When ammonium converts to nitrate there is an acidifying effect in the soil and iron and other elements are more available in high pH soils.

Zinc

Zinc is a component of several plant enzymes and is a part of plant auxins which control the synthesis of indoleacetic acid which regulates growth compounds. Zinc also affects the intake and efficient use of water by plants.

Manganese

Manganese is an activator for enzymes in plants. In the absence of manganese, plants cannot use the iron which they have absorbed. Manganese assists the iron in chlorophyll formation which causes yellow turf to green up.

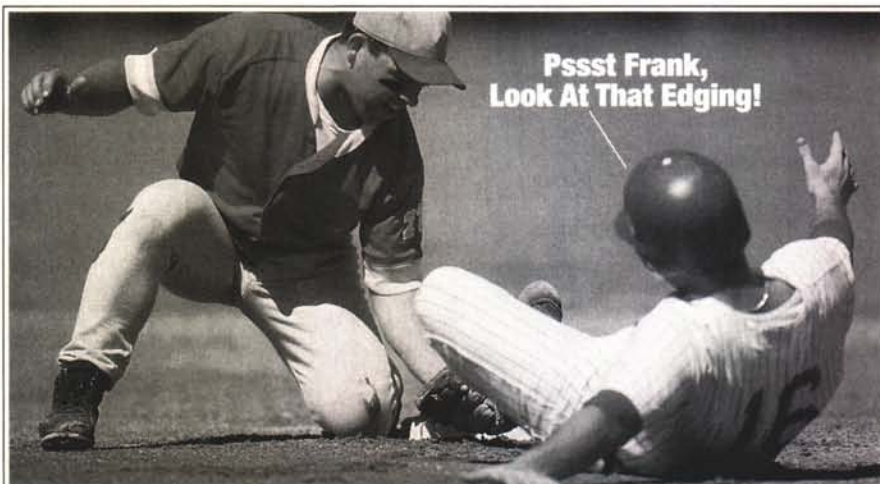
Other Micronutrients

Micronutrients boron, copper, chlorine and nickel are used in very small quantities by plants and are generally available in most soils. Some of these elements can be toxic from excess amounts which may be found in sewage effluent water and sewage sludge used as a granular fertilizer on plants.

Sports Field Application of Micronutrients

Application of micronutrients to sports turf is a common practice in many parts of the United States. Many fertilizer products include the primary micronutrients as a standard practice.

Care should be taken to supply the essential nutrients and micronutrients to sports fields to avoid unhealthy growth and color. Many reputable fertilizer companies have micronutrient packages that will enhance the color and vigor of the turf. Improper construction of athletic fields, fields with poor drainage and poor aeration and soils with high or low pH ranges all have problems with deficiencies or toxicity of micronutrients. Have the soil analyzed, utilize tissue tests and apply high quality fertilizer materials with micronutrients to maintain a quality sports turf.



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