

CHALKBOARD

TIPS FROM THE PROS

Getting the Most Out of Nutrients

For more than 50 years fertilizer manufacturers and turf extension agents have been extolling the virtues of three fertilizer components—nitrogen, phosphorus and potassium. Only lately have the other ten nutrients required by plants started to receive an appropriate amount of consideration. They are calcium, magnesium, sulfur, iron, copper, zinc, manganese, chlorine, boron and molybdenum.

Dr. William Barone of R.G.B. Laboratories, Inc., says these other nutrients, although required in smaller quantities than the three primary nutrients, are as important to the turf. Barone says the nutritional status of the plant is dependent upon the most limiting nutrient in spite of abundant amounts of all the other nutrients. In other words, nutrients that are not utilized by a plant due to the shortage of another nutrient are wasted.

A classic example is iron chlorosis, characterized by interveinal yellowing in the new growth stages of the plant. If this condition persists, the plant's ability to synthesize chlorophyll is gradually curtailed, the plant loses pigmentation and begins to dieback. A deficiency in the micronutrient iron causes severe consequences even in the presence of abundant amounts of all the other essential nutrients.

Even when sufficient amounts of nutrients exist in the soil, Barone states numerous soil conditions can make them unavailable to plants. Any condition that causes a nutrient to lose its water solubility will cause a deficiency of that nutrient. For example, many micronutrients become less water soluble when the soil pH becomes more alkaline than 7.0. Excess phosphate in the soil and heavy clay soils tie-up iron, manganese, copper and zinc making them less available to plants.

One way to guard secondary nutrients and micronutrients from unfavorable soil conditions, says Barone, is to apply them in chelated form. A chelate (key-late) is a water soluble combination of a nutrient bonded to an organic molecule. The chelate protects the availability of the nutrient for plant uptake. When the organic molecule eventually breaks down the nutrient is released for use by the plant.

Iron chelates produce a longer lasting green-up response to well-maintained turf than iron sulfate, Barone states. "Most golf course superintendents will acknowledge that a spray application of iron sulfate gener-

ates a green-up which lasts 4-5 days, in contrast to 2-3 weeks for iron chelate," says Barone. The chelate holds the iron in a form which is not oxidized as is the iron form in iron sulfate. Oxidized iron is rust, an insoluble form of iron which is not available for plant uptake.

Problems with tank mix compatibility can also be avoided by using chelated micronutrients instead of inorganic forms says Barone. For example, he states, iron sulfate will precipitate immediately in the presence of liquid phosphate fertilizers and salts of most common herbicides. The resulting precipitate, iron phosphate, is quite insoluble even though it may remain in suspension in the tank under constant agitation. The nutritional value of both the iron and the phosphate will be greatly reduced.

In the case of herbicides (such as the amine salts of 2,4-D and MCPP, or the potassium salt of MCPP) Barone says iron in an unchelated form will cause an immediate precipitation reaction resulting in the loss

availability and for preventing undesirable reaction with other chemicals in the tank mix.

Preventing Pythium

Although the first symptoms of Pythium disease on turf aren't evident until temperatures and humidity reach summer levels, within days it can wipe out many acres of quality turf. Research has now shown the time to start fighting this serious turf disease is before with a program of preventative fungicide applications.

After four years of extensive field tests, Dr. Houston Couch, professor of plant pathology at Virginia Tech, concludes, "There aren't many ways to control Pythium from a management standpoint. Sports turf managers are often locked in on what they can and cannot do. This is why the recommendation is to use a systemic fungicide on a preventative basis. A preventative program holds down the number of infected plants and this is important because Pythium can be present before any visible symptoms are seen. By preventing these symptoms from showing up, sports turf managers are assured of optimum control. It's to their advantage to start treatments as early as possible."

"Mid-July to mid-to-late fall is prime time for Pythium here," says Steve Durand, superintendent of the Tournament Players Club in Ponte Vedra Beach, FL. "This is when high temperatures and high humidity are optimum for Pythium." Durand has started following a preventative program based upon the systemic fungicide Subdue from Ciba Geigy.

Max Schultz, superintendent of St. Clair Country Club in Pittsburgh, PA, has been following a similar program of preventative Pythium control which he starts in mid-June. "This has helped tremendously in keeping Pythium under control."

Another advocate of Pythium prevention is Gary Hamm, superintendent of the Red Fox Country Club in Tryon, NC. "We can't afford a wait-and-see attitude toward disease control. We combine systemic control with aerification. We have found aerification helps prevent root rot and improves air and water movement in the soil. Systemic fungicide applications are made every three weeks before and during high stress periods. In between systemic applications we use a contact spray."

"If you can catch the disease with a preventative treatment, you'll save money in the long run," says Schultz.

The Ten Other Nutrients

Calcium Magnesium
Sulfur Boron
Chlorine
Copper
Iron
Manganese
Molybdenum
Zinc

of the iron nutrient and a significant portion of the weed-killing activity of the herbicide. Again, the insoluble precipitate can be sprayed under constant agitation, but its value is greatly reduced.

Barone warns, however, that many chelated mineral products cause a drop in the pH of the tank mix since they are acidic. Some pesticides may be affected by highly acidic or alkaline conditions. To prevent pH problems with pesticides, R.G.B. Laboratories' Agri-Plex chelated products have a unique buffering capacity which permits preparation of pesticide tank mix formulations having pH values in the vicinity of 7.0.

There are other types of nutrient complexes which protect the solubility of nutrients. Barone says the extent of protection by these lies somewhere in between chelates and standard inorganic forms. He contends that fully chelated mineral products provide the maximum benefit for maintaining nutrient