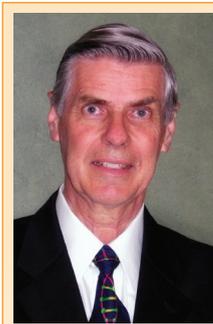


Calcium and the soil have a rocky relationship

SALT can be a killer of turfgrass and other landscape plants, and it has other deleterious effects such as contributing to soil erosion and increasing compaction. It is well known that the addition of soluble calcium to sodic soils is the best corrective measure. What is less well known is how complex this relationship is and how the choice of calcium amendment can affect the outcome.



Garn Wallace,
Owner, Wallace
Laboratories,
El Segundo,
Calif.

If there is anyone who can provide sound information on this topic, it is Garn Wallace, owner of Wallace Laboratories in El Segundo, California. For many years he has been a soil remediation consultant to the horticultural and agricultural industries. He has confronted salt in many forms in his work with clients such as Disneyland and the City of Los Angeles, and he can talk for hours on the primary solu-

tions to salts common in the western states such as sodium chloride and sodium sulfate. In addition, soils may not be salty but simply sodic, or high in exchangeable sodium which clings to the soil particles.

“Salts are a union of an acid and a metal,” Wallace says, and plants pick them up through water intake. However, salts have a high osmolarity, or affinity to water, which results in highly saline soils actually sucking water out of the plant. In this way, salt becomes a toxin, causing plant stress, wilting and reduced uptake of nutrients. “That’s why we can die after we drink seawater.” Soils that are simply sodic can result in a loss of plant vigor and poor drainage.

The Solution

Calcium, when added to salty and/

or sodic soils that are low in calcium, replaces the sodium in or on the soil particles. In addition to improving water uptake in plants, Wallace says, calcium sulfate has many other beneficial properties when applied at the proper rates. Calcium improves soil structure and prevents crusting; it decreases the pH of alkaline soils and increases the pH of acidic soils; it makes organic matter more usable by the plant; and it helps prevent erosion and dust when applied properly. It is particularly beneficial in clay soils and can prevent waterlogging.

Common Sources

“You’re applying a nutrient required for plant growth,” Wallace adds, pointing out that the most common and economical sources of calcium sulfate for landscape uses are gypsum and anhydrite. Gypsum is calcium sulfate dihydrate, and anhydrite is anhydrous calcium sulfate. Both are found in natural deposits and mined for landscape use. Anhydrite contains no water and is more concentrated, while gypsum contains about 21% water. There are several commercial forms of each, with “ag grade” being a crushed and irregularly sized product and “prilled” being a form that is wetted and formed into pellets. “Solution grade” is a powder form.

Gypsum is the traditional soil amendment, but Wallace recommends a product called Cal-CM Plus for many amendment situations, because it contains a mix of both gypsum and anhydrite. He explains that gypsum releases all of its calcium soon after contact, while anhydrite releases its calcium gradually over several weeks. This makes Cal-CM Plus advantageous for two reasons. First, a combination of the products allows a quick neutralization of the sodium or salts as well as allowing a carryover that continues for a month or more afterward.

Second, adding too much gypsum by itself to saline or sodic soils that already contain calcium can produce an explosion of sodium sulfate, which is in itself a salt and can be more toxic to plants than the pre-existing salts. Calcium replaces exchangeable sodium on the soil particles forming sodium sulfate as a by-product and increasing the exchangeable calcium in the soil. Since the solubility of sodium sulfate is about 20 times greater than calcium sulfate, sodium sulfate can render the soil highly saline. Wallace emphasizes the importance of soil testing prior to application of amendments so that the correct balance can be achieved. Once that is determined, in most cases a combination of gypsum (for quick release) and anhydrite (for slow release) is recommended.



Use of calcium in sodic soils prevents soil clogging and improves water infiltration.
Photo courtesy of Brian Whitlark, USGA.

“Cal-CM Plus just lasts a lot longer. You will get a spike of calcium to flush the salt out, and then you will have benefits in a flatter line for up to a month or so,” says Richard Taylor. He’s an agronomist for the Art Wilson Company, which manufactures the product. He confirms Wallace’s analysis that the combination of gypsum and anhydrite allows this product to combat salt and sodium without a toxic effect.

Taylor notes that the base materials are ground to a fine mesh size prior to prilling so that Cal-CM Plus is highly soluble. The slow-release effect makes it less likely to quickly wash out of sandy soils, and to be longer lasting in areas of high rainfall. He also points out that while gypsum is transported to the West from Eastern states, anhydrite is mined in Nevada. That lowers the cost of transportation and ultimately keeps the cost to landscape managers low.

Southwest Perspective

Another perspective is provided by Brian Whitlark, the Southwest Regional Agronomist for the United States Golf Association. He seconds Wallace’s contention that soil testing and subsequent interpretation of the results by a qualified professional are crucial. Calcium in the form of gypsum is often applied when not needed. In addition, it is often applied as a nutrient by golf course superintendents and turfgrass managers, and that typically is not its purpose in the desert Southwest.

“That said, I’m a big proponent of using calcium in the right situation,” Whitlark says. Soil clogging is a widespread problem, and he has seen striking improvements in water infiltration, in particular, in the sodic soils of the Southwest after the use of calcium products.

Whitlark noted that he has worked with Cal-CM Plus successfully in both the lab and the field. Furthermore, he commented that a clean source of gypsum and anhydrite is important, because impurities such as calcium carbonate in natural gypsum can render it less effective.