

CUTT

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Rip Van Winkle and Turfgrass Fertility

I feel like Rip Van Winkle, the Dutchman in the Washington Irving tale who fell asleep atop a Catskill knoll and awoke 20 years later only to realize how much the world had passed him by. Before I “fell asleep,” potassium was a regular macronutrient, required in roughly equal amounts to nitrogen. By the time I “woke up,” many turfgrass managers deemed potassium the most important nutrient, required at levels as much as six times that of nitrogen.

I suspect a few things happened during the period of my slumber that could lead one to think they need more potassium. First, there is more soil with high salinity content today than in past years, and additional potassium can help adjust those sodium problems. Second, treatment methods embraced by soil-consulting firms require more potassium. And third, although evidence suggests that potassium can enhance drought and wear tolerance, there is no evidence that most golf courses lack the required amount of potassium.

Now that I am awake again, it is clear to me that no one is reading the research material available on potassium. Gratuitous potassium applications have become the norm regardless of the real need.

Leaching, Leaching, Leaching

Sodium is detrimental to plant and soil health. Increased use of poor quality irrigation water, especially water that is high in sodium, has led to a perceived need to increase the

amount of potassium. In addition, areas with low rainfall exacerbate sodium accumulation problems by limiting leaching.

Bob Carrow, a professor at the University of Georgia, writes that at most potassium is required in equal amounts to nitrogen. His findings are obvious to other plant researchers. It's a mystery how his findings, and those of other researchers, have been misinterpreted to the point that some turf managers use up to six times as much potassium as they do nitrogen.

Carrow has a mantra to help turfgrass managers understand the most effective means of solving sodium problems: “Leaching, leaching, leaching” he said during seminar after seminar and in almost every article he has written on the subject. Consequently, the leaching of harmful cations, or positively charged ions, such as sodium, will also leach important cations, such as potassium. Therefore, more potassium must be applied but in equal proportion to nitrogen.

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Potassium is viewed by some as more important than nitrogen because potassium can “be out of balance” and can be leached out of the soil. Therefore, consultants believe potassium is required in significantly higher amounts regardless of plant response. I’m feeling like Rip again.

A recent study at Cornell University showed that turf treated with high rates of potassium (not in a 1-to-1 ratio with nitrogen) was significantly more susceptible to snow mold and slower to recover than turf that did not receive potassium. A subsequent study at the University of Massachusetts supported these findings.

Science vs. Theory

Most turfgrass managers attended a Soils 101 class during formal turfgrass education. One of the basic tenets of soil nutrient management is testing for nutrients in the soil that might be available to the plant and applying those nutrients to elicit a response.

This fundamental principle of soil nutrient management that nutrients are applied to elicit a response makes sense. However, nutrient applications based on some cation balance theory rather than scientific research, which is promoted by many soil consultants, is irresponsible.

If you are concerned about cation balances such as potassium, testing for pH levels is a simple method for evaluating how cation balance can be adjusted. The current trend to interpret soil tests based on cation balance was adapted from production agriculture and has never been proven to be significant for turf nutrient management. In fact, a few recent studies have refuted its application to turf.

Cation balance interpretations typically lead to application rates of nutrients such as calcium and potassium that are higher than necessary when compared with interpreting based on plant response. Potassium is viewed by some as more important than nitrogen because potassium can “be out of balance” and can be leached out of the soil. Therefore, consultants believe potassium is required in significantly higher amounts regardless of plant response. I’m feeling like Rip again.

Diminished Stress Tolerance

Potassium is an important ion for managing water. It is involved in cellular hydraulics as well as regulating stomatal conductance that governs water movement throughout the plant.

A significant amount of research was conducted about 15 years ago on the subject of

potassium’s role in water management throughout the plant. Research showed that adequate levels of potassium must be maintained in the soil to enhance a plant’s stress tolerance. The 6-to-1 potassium-to-nitrogen ratio that some turf managers have adopted since I fell asleep could be adversely affecting stress tolerance.

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Simplify

We can all learn something from Rip Van Winkle. When he awoke, there was much disbelief about him and his story and from him about how the world had changed. No one believed he had slept for 20 years, and he could not comprehend that he no longer was a subject of King George—and his nagging wife. He always had appreciated the simple things in life and was more accepted by the younger members of society who could learn from his simple wisdom.

I find that I anger some people in the turf industry when I give talks about how detrimental high rates of potassium can be to plant health. I can tell by looking into the eyes of those in the audience the turf managers who have embraced the practice of high application rates of potassium and those who never have understood why so much potassium was needed.

It’s time for our industry to take a step back to simpler times when potassium applications were not made gratuitously, but were based on science and expectations of performance. Maybe it’s time we all woke up.

Frank S. Rossi

