

Tips from the USGA:

BCSR — Base Cation Saturation Ratios

by Mike Huck, USGA Green Section - Southwest Region

Bob Vavrek of the North Central Region of the USGA Green Section recently wrote the following article based upon a presentation at the Wisconsin Turf Conference. It was posted as a *Regional News Update* on the USGA web page. I felt this would be good information to share, especially with the current popularity of balancing base cation saturation ratios based upon soil tests.

Calcium/Magnesium Ratios: Helpful, Hype, or Hogwash?

By Bob Vavrek

Dr. Wayne Kussow's (University of Wisconsin-Madison) talk regarding the potential benefits of balancing the ratio of exchangeable calcium to magnesium in the soil by fine-tuning fertilizer applications was one of the more interesting and informative presentations I have seen in quite a while.

After performing a literature search on the subject of Ca/Mg ratios, he found that the idea of balancing the ratio of cations in the soil goes back a hundred years or so. Early research indicates that the effect of a specific Ca/Mg ratio on crop yield varied a great deal depending on the crop.

The bottom line was that the information gleaned from a simple soil test can help superintendents maintain adequate levels of nutrients in the soil - but don't worry about adjusting the level of one cation to balance another. Just keep the levels of Ca, Mg, and other nutrients from falling below a value that would have a negative impact healthy plant growth—there is plenty of research in turf and other crops to support this theory. There is

little evidence to support the theory that the proper *ratio* of cations will provide ideal turf. In fact, the old research was done on crops like clover, and it should come as no surprise that there were no research studies to be found regarding turf. He posed an interesting question or two at the end of the talk. Why is it that you never find a fertilizer recommendation based on a cation ratio on an *independent* University soil test? Why are they often found on a soil test from a consultant affiliated with a fertilizer or chemical company?

Extrapolating yield data from other crops to turf is always risky business—even if the data supported the hypothesis in the first place. After all, the goal of turf management is not to see who can produce the most clippings. In any event, this concept is a great example of how a theory can mystically and magically transform into a hard fact when enough of the sales force gets together and chant the mantra over and over.

Have a safe, restful, and educational off-season—spring will soon be here! -Bob Vavrek

Okay, so that is just one man's opinion correct? Well, Jim Skorulski from our Northeastern Region reported similar comments from a presentation made by Dr. Jim Murphy (Cook College - Rutgers) at the New York State Turfgrass Conference. Dr. Murphy feels that "These ratios are being taken too literally and results of the initial work conducted in the 1940's have never been verified on turfgrass". He also commented that base cation saturation ratios can generate expensive fertilizer and amendment recommendations not justified by research.

So you still don't believe two Ph.D.'s from reputable universities? Then refer to *Soil Testing and Plant Analysis*, 3rd Edition, from the Soil Science Society of America, Pages 192 & 193. This reference reports no results in the literature confirming the existence of ideal cation saturation ratios, and wide variations in BCSR are of little consequence as long as

gross imbalances are not created. Calcium and Magnesium recommendations based on cation saturation percentages and the resulting Ca/Mg and Ca/K ratios are not warranted, instead it recommends striving to maintain soil pH between 5.5 and 6.0 for maximum nutrient availability. (SSSA Book Series No.3. available from SSSA, \$38.00, www.soils.org and then to online store, SSSA book series.)

This isn't suggesting that you cannot have healthy turf following BCSR recommendations, what it does suggest is that healthy turf can be grown with less nutrients than recommended by BCSR. Additionally, you would need to think it through and ask yourself: If more nutrients than needed are applied using this method, where do they ultimately end up? The drainage water? Ground water? Surface runoff? Also, who or what benefits from this management practice? Probably