Irrigation Water Quality

With irrigation season well underway a timely topic for review is; how to assess irrigation water quality, its impact on soil drainage and ultimately turf quality.

To help turf managers address these issues, there are several testing tools available to categorize irrigation water quality; **electrical conductivity (ECw)** and **sodium absorption ratio (SAR)**. When assessing water quality these are the two most important values to include in your monitoring program. They have the greatest affect on soil and turf quality. Electrical conductivity measures the total salt load dissolved in the water and SAR determines whether sodium salts are the causal element.

Total salt has a direct affect with plant available soil moisture; salt has a higher affinity to hold on to soil water
than a plants ability to extract it. As a result, as soil soluble salt increases, plant available moisture decreases. The chart below provides a guide as to what constitutes a high or low value; note that plant species have different abilities to tolerate salt (or extract moisture). This is one of the reason salt tolerance is a trait desirable in some turf grass varieties.

Total salt content is measured using electrical resistance and usually reported as millimhos/centimeter (mmhos/cm). However, there are other terms used to describe electrical conductivity; total dissolved salts and total dissolved solids. These terms are normally reported in parts per million (ppm). To convert ECw into ppm, use the following formula: ECw x 640 = ppm.

A common misconception is that sodium "is" the salt dissolved in the water. The chemical definition of "salt" is an ionic compound containing balanced parts of cations and anions. Sodium compounds are only part of the total. However, sodium is an important component to measure, not only does sodium add to the total salt load, it also has a negative effect on the structure of the soil. It breaks down the structure of the soil into individual soil particles. The result is reduced soil/water infiltration rates. Calcium has a reverse affect; it has flocculating properties resulting in development of soil structure. The bottom line is to effectively determine if sodium is high enough to be a concern, managers must know how much calcium and magnesium are also present. This is the reason for the calculating the SAR. It is a ratio comparing the level of sodium to that of calcium and magnesium.

The following table is a quick reference for rating irrigation water quality:

Classification	ECw	SAR
Low	<0.25	<4.0
Medium	.25 - .75	4.0 - 6.0
High	.75 - 3.5	6.0 - 10.0
Very High	>3.5	>10.0

Soil Drainage:

It is important to note that the removal or reduction of salt from the soil is accomplished through the process of leaching. The effectiveness is dependent up on the texture and structure of the soil as well as the quality of the water being used to leach. Look for the next newsletter for more information as to how salt and sodium affect soil drainage.

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