LITCHFIELD ANALYTICAL SERVICES

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Feeds Forages Mycotoxins Soils Plant Tissues Manure Fertilizers Lime Water

Irrigation Water Analysis is Important

The concentration and composition of irrigation water combined with the amount of water used determines its suitability for irrigation. Crops vary in their tolerance to various components of irrigation water. Soils also vary in their capacity to resist adverse changes due to the components of water. A comprehensive water analysis will indicate its suitability for irrigation use.

Sample Collection

Use a clean 16 ounce glass or plastic container with a leak-proof lid. Samples from wells should be taken after the pump has been running for at least a half hour. The sample can be caught directly from the pump discharge. If the sample is taken from a stream, it should be collected from running water during the irrigation season. Send the sample to the laboratory as soon as possible after collection.

Interpreting Your Water Analysis Report

Sodium

Sodium is the most troublesome of the major components of irrigation water. Excessive sodium can cause soil structure problems. Sodium salts can reduce water uptake by plant roots.

Calcium & Magnesium Hardness

These cations are essential plant nutrients. Both calcium and magnesium are associated with soil aggregation and friability. Large quanties of calcium and magnesium in irrigation water can increase soil pH, resulting in reduced availability of trace elements and phosphorus.

Chloride

High levels of chloride can cause leaf burn and root toxicity.

Conductivity / Total Dissolved Solids (TDS)

Conductivity / Total Dissolved Solids is used as a general measure of water quality. High levels of these parameters usually mean high levels of dissolved minerals and salts.

Sulfur

Sulfur is essential for plant growth. Most sulfur in irrigation water is usually present in the sulfate form. It is important as a nutrient in irrigation water where there is low available sulfur from other sources.

Nitrate Nitrogen

Nitrate (NO3) in irrigation water can be used by the plant. Excessive levels of nitrogen may cause delayed maturity in certain crops.

pH

Most water supplies have a pH between 6.5 and 8.0. Water which is too acid or too alkaline can have a detrimental affect on plant development.

Carbonates / Bicarbonates

High levels of carbonate and / or bicarbonate will remove calcium and magnesium from the soil clay complex. This may leave sodium in their place resulting in an alkali soil condition.

Phosphorus / Potassium

These elements are essential plant nutrients. If present in irrigation water, they can help supply some of the plant's nutrient requirements.

Boron

Boron is an essential plant nutrient, but at high levels, it can be toxic to plants. Crops vary greatly in their tolerance to Boron.

Sodium Absorption Ratio (SAR)

The Sodium Absorption Ratio (SAR) is an index of the sodium to calcium and magnesium in water.

Table 1. General Guidelines for Concentration of Substances in Irrigation Water

	Parts Per Million (ppm)		
	Preferred	**Potential Problems**	**Severe Problems**
pH	5.5 to 7.5	< 5.5 or > 7.5	< 4.5 or > 8.5
Alkalinity (ppm)	< 400.00	> 400.00	*
Bicarbonate (ppm HCO3)	< 40.00	> 40.00	> 180.00
Carbonate (ppm CO3)	< 15.00	> 15.00	> 20.00
Conductivity / EC (mmhos/cm)	< 0.75	> 0.75	> 3.00
Sodium Absorption Ratio (SAR)	< 3.00	> 3.00	> 6.00
Nitrogen, Ammonic (ppm NH4-N)	< 10.00	> 10.00	*
Nitrogen, Nitrate (ppm NO3-N)	< 75.00	> 75.00	*
Nitrogen, Nitrite (ppm NO2-N)	*	*	*
Phosphorus (ppm P)	< 30.00	> 30.00	*
Potassium (ppm K)	< 100.00	> 100.00	*
Calcium (ppm Ca)	< 75.00	> 75.00	> 150.00
Magnesium (ppm Mg)	< 30.00	> 30.00	> 50.00
Sulfur, Sulfate (ppm SO4-S)	< 40.00	> 40.00	> 100.00
Boron (ppm B)	< 0.50	> 0.50	> 2.00
Chloride (ppm Cl)	< 70.00	> 70.00	> 300.00
Copper (ppm Cu)	< 0.20	> 0.20	*
Iron (ppm Fe)	< 4.00	> 4.00	*
Manganese (ppm Mn)	< 2.00	> 2.00	*
Molybdenum (ppm Mo)	< 0.20	> 0.20	*
Sodium (ppm Na)	< 70.00	> 70.00	> 180.00
Zinc (ppm Zn)	< 1.00	> 1.00	*

* No Limit Established

Useful Conversions

1 mg / Liter	=	1 ppm
1 ppm	=	2.72 lbs / acre foot
1 ppm	=	0.23 lbs / acre inch
1 gpm	=	0.0022222 acre inch / hour
1 lb / acre foot	=	0.367647 ppm
1 lb / acre inch	=	4.347826 ppm
1 acre inch / hour	=	450 gpm