# INTERPRETING IRRIGATION WATER ANALYSIS

FACT SHEET

The concentration and composition of dissolved constituents in water combined with the amount of water used determines its quality 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 components of the water. A comprehensive water analysis will indicate its suitability for irrigation use.

## SODIUM

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

## CALCIUM/MAGNESIUM

These cations are essential plant nutrients. Both calcium and magnesium are associated with soil aggregation and friability. Large quantities 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

Conductivity/TDS 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 plants. 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-N

Nitrogen 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. Waters which are too acidic or too alkaline can have a detrimental affect on plant development.

## BICARBONATES/CARBONATES

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

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## PHOSPHORUS/POTASSIUM

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

## BORON

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

## SODIUM ABSORPTION RATIO (SAR)

SAR is an index of the sodium hazard of water. It is based on the ratio of sodium to calcium and magnesium.

## SAMPLE COLLECTION

Use a clean 16oz glass or plastic container wit a leak-proof lid. Samples from wells should be taken after the pump has been running for a least 1/2 hour. The sample can be caught directly form 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.

| **INTERPRETIVE GUIDELINES FOR IRRIGATION WATER ANALYSIS** | | | | |
|---|---|---|---|---|
| **Parameter** | Units | Potential Problems | | |
| | | None | Increasing | Severe |
| **Sodium (Na)** | mg/l | <70 | 71-180 | >180 |
| **Chloride (Cl)** | mg/l | <70 | 71-300 | >300 |
| **pH** | —- | 5.5-7.5 | <5.5 or >7.5 | <4.5 or >8.5 |
| **Bicarbonate ($HCO_3$)** | mg/l | <40 | 41-180 | >180 |
| **Carbonate ($CO_3$)** | mg/l | <15 | 16-20 | >20 |
| **Conductivity** | mmhos/cm | <0.75 | 0.76-3.0 | >3.0 |
| **Boron** | mg/l | <0.5 | 0.6-2.0 | >2.0 |
| **Sodium Absorption Ratio (SAR)** | | <3 | 4-6 | >6 |

| | | | |
|---|---|---|---|
| mg/l | = milligrams per liter | ug/l | = micrograms per liter |
| mmhos/cm | = unit of conductance | EC | = electrical conductance |
| > | = more than | < | less than |
| $SO_4$-S | = $SO_4^{-}$ x 0.333 | $NO_3^{-}$-N | = $NO_3^{-}$ x 0.226 |
| TNTC | = too numerous to count | 17.1 mg/l | = 1.0 grain/gallon |
| mg/l x 0.23 | = lbs/acre inch | mg/l x 2.72 | = lbs/acre foot |
| gpm | = gallons per minute | 450 gpm | = 1 acre inch per hour |