



Hold the Salt, Please: Salinity, Citrus Trees, and What We Can Do About It

Everything in Moderation

Unless you have perfect discipline, you've probably overconsumed a food or beverage at some point in your life, whether it was beer or Ben & Jerry's.

So you've learned through experience (like the rest of us), that too much of a good thing can be harmful.

In general, overconsumption of *anything* can hurt, and a high concentration of certain nutrients in the soil can cause an "overdose."

How Does Salinity Occur?

Salts are naturally found in soil. The problem arises when salinity levels become *too high*.

Salinity is a primary abiotic factor in [decreasing vegetative growth and yield](#). Salinity can cause osmotic stress, ion toxicity, and nutrient imbalance. Salinity can even damage soil, and after several decades of salt accumulation, the soil can deteriorate and become significantly less fertile.

We can trace salinity to poor quality irrigation water that's overladen with chemical fertilizers. Salinity is especially common in arid areas, where the vegetation receives minimal rainwater and constant irrigation. Making matters worse, it seems that global climate change could potentially increase salinity by exacerbating existing problems and altering the properties of the soil.

The Dangers for Citrus Trees

Citrus trees grow in hot, dry climates, so they're easy prey for salinity's damaging impact. To flourish, citrus trees need specific soil composition. When it comes to EC levels, each dS/m above 1.4 dS/m can cause a 13% decrease in the overall fruit yield and certain levels can be fatal:

- EC (electrical conductivity) levels of 3dS/m
- SAR (sodium adsorption ratio) value of 9
- Chlorine concentration of 360 PPM



High concentrations of sodium (Na^+) and chloride (Cl^-) are common factors in causing [salt stress](#). High levels of Cl^- result in low chlorophyll levels and chlorosis, a condition that triggers the inhibition of certain metabolic processes. Chlorosis manifests through shorter leaf lifespans, leaf burn, yellowing leaves, and decreased shoot and root growth.

High levels of Na^+ can deplete the soil, dispersing clay particles, causing poor soil aeration and water infiltration.

Moreover, salinity has cost the world quite a bit of money. [Scientists estimate](#) that salt-induced land deterioration costs \$27 billion in annual global revenue.

So How Can We Mitigate The Salinity Problem?

As farmers, we can incorporate optimal agricultural practices that will alleviate salinity. These practices include:

- Applying extra irrigation water to leaching salts from the root zone
- Customizing the irrigation system-- amount, frequency, and type of system-- based on tree age and species, climate, and soil type
- Using rootstock-scion combinations, such as the Cleopatra mandarin rootstock
- Applying appropriate fertilizers solutions that include different mixes of calcium and nitrate
- Applying [biostimulants](#), [plant-growth-promoting microbes](#), and [hydrogels](#)
- Monitoring irrigation and salinization using soil solution testing, tensiometers, and other sensors

With today's ag-tech advancements, we also have another practical tool at our fingertips to reduce salinity: remote sensing technology.

How Can Remote Sensing Technology Help Farmers Battle Salinity?

In the 1960s and 70s remote sensing technology was a large-scale, expensive procedure. NASA scientists used remote sensing tech to capture satellite images of the Earth's surface.

Today, remote sensing technology has become more convenient and affordable, allowing farmers around the globe to take aerial images of their farms and track tree and soil health.

SeeTree integrates remote sensing technology to collect data for farmers to put the pieces of the farming puzzle together. Through aerial photos and consistent monitoring, SeeTree ag-tech enables farmers to centralize all their agricultural information so they can analyze the big picture to determine the root cause of their problems.



With [soil salinity expected to increase](#) in the coming years, it's more important than ever that we take proactive steps to reduce it. By harnessing remote sensing technology, farmers can gradually rehabilitate their soil for healthier trees, produce, people, and the planet.