



knowledge to grow



## What is Soil Electrical Conductivity?

When it comes to discussing soil electrical conductivity, we're not talking about amps and volts, we're actually referring to the indirect measurement of the total dissolved soluble salt content of the soil.<sup>1,2,3</sup>

Of course, the age-old warning (well as old as Thomas Edison anyway), that water and electricity don't mix is definitely true, but pure water is a rather poor conductor of electricity. However, as more and more salt is dissolved into water, the electrical conductivity increases.<sup>3</sup>

High concentrations of soluble salts in close proximity to the root zone of growing plants can drastically impede and restrict plant root growth. The challenge with soluble salt is that it can cause very severe problems for plants without seriously affecting the salt concentrations in the rest of the soil.<sup>2</sup>

Compounding the challenges with high soluble salts is that excess salts can dissipate quickly into the surrounding soils with rainfall and soluble salts also interfere with the uptake of water by plants.<sup>2,3</sup>

As water in the soil evaporates the concentration of salt increases because a given amount of salt in a soil provides a higher salt concentration in soil water if the amount of water is small.<sup>2</sup> Therefore, plant growth is most affected by soluble salts in periods of low moisture supply, for example during periods of drought, and in soils with lower water storage capacity (such as sands and gravels).<sup>2</sup>

Soluble salts in soils can originate from a number of different sources but the most common are as a result of excessive applications or spills of fertilizers and manures, runoff of salts applied to roads and chemical



What happens when you screw a light bulb into a hole in the ground? Not a whole watt!



spills.<sup>2</sup> For some areas, particularly in Northern Ontario, there can be high salt levels if there have been brine seeps or spills from recent or historical oil and gas exploration and mining operations.<sup>2</sup>

There are a few different approaches commonly used for measuring soil EC but they basically involve:

- (1) measuring a mixture of water and soil directly; or
- (2) measuring the solution extracted from a mixture of water and soil.<sup>2,3</sup>

### References:

1. Gregorich, E.G., et al. (Eds.). *Soil and Environmental Science Dictionary*. Canadian Society of Soil Science. CRC Press, 2001.
2. Munroe, Jake, et al. *Soil Fertility Handbook Publication 611, 3<sup>rd</sup> Edition*. Ontario Ministry of Agriculture, Food, and Rural Affairs. Province of Ontario, 2018.
3. Weil, Ray R., and Brady, Nyle C. *The Nature and Properties of Soils, Fifteenth Edition*. Pearson Education, 2017.