Mottes Tensiometers
Manufacturers of: High Quality Electronic Tensiometers, GSM Loggers with Internet System, Soil Solution Extractors, EC Markers & Test Kits.
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Analysis of soil solution test results

The Mottes line of soil solution test kits features extremely reliable measure devices for the four most important components in healthy plant growth: E.C., Chloride, Nitrate, and pH.

Electric Conductivity – E.C.

Accurate measurement of the salinity of the soil is a decisive aspect in plant development. The Electric Conductivity, measured by millimohs, increases or decreases in relation to the salinity level. In distilled water the Electric Conductivity is Zero. The Electric Conductivity of the dropper or sprinkler water consists of the conductivity of the water source plus the conductivity of the fertilizer solution. The Electric Conductivity of the soil solution should not exceed the conductivity of the dropper or sprinkler water in more than 0.5 millimohs – and this is the recommended optimal conductivity level. For example: if the conductivity of the water source is 0.5 millimohs, and the conductivity of the dropper or sprinkler water is 1.0 millimohs – the optimal conductivity level of the soil solution will be between 1.0 to 1.5 millimohs. In this case the soil solution conductivity should not exceed 1.5 millimohs, otherwise it means that the dosage of fertilizer should be gradually reduced, on behalf of the plant. Accordingly, while the dropper or sprinkler water conductivity stays constant but the soil solution conductivity is lower, it means that there is a lack of fertilizer, which should be raised up to the optimal level. When the rise in soil solution conductivity is not caused by a rise at Nitrate level, but as a result of an accumulation of other salts, the soil at the root zone should immediately be leached. The optimal conductivity level changes according to the water quality, type of soil, and plant.

Chloride – CL

The Electric Conductivity of the soil solution is comprised mainly of two elements: Nitrate and Chloride. Both of these elements are highly soluble, easily rinsed, and their presence is readily indicated in soil solution tests. A rise or a decline of Chloride level affects the Electric Conductivity level of the soil solution. **35 mg/liter (PPM) of Chloride = 0.1 millimohs**. An excessive amount of Chloride is poisonous to plants and prevents plants from absorbing fertilizers. It is therefore necessary to keep an ongoing check of Chloride levels and to leach the root zone when the level is too high. In this case, a follow-up test should be carried out to determine if the excess Chloride was washed away and the root zone is back to normal. Throughout the growing season, in addition to regular soil solution tests, tests of the irrigation source should also be conducted in order to make a comparison of the Chloride level in the source with the accumulated level in the soil. For example: if the Chloride level in the water source is 150 milligram per liter, and the soil solution test revealed 200 milligram per liter – the ground's Chloride level is within the normal range. But if a later test revealed a 300 milligram per liter reading, then too much Chloride has been accumulated in the soil and the root zone needs to be leached.

Nitrate – NO_3

Most of the Nitrogen in the soil is in the form of Nitrate (NO_3) – a component of major importance to the plant's development. This is the form of Nitrogen favored by most plants. Even when Nitrogen is supplied in its Ammonium form (NH_4), most of it will be transformed into Nitrate (NO_3). This is the most soluble and most easily rinsed form – emphasizing the importance of regular, ongoing testing. The soil solution indicates the exact amount of this form of Nitrogen in the ground. The grower should be aware of changes occurring to the Nitrate level in the soil solution, in order to keep an optimal level. It is very important that the grower will know and write down the dosage of Nitrate given through the fertilizing system, in order to correct the quantity, and according to the changes at Nitrate level in the soil solution to increase or decrease the dosage. Also, it is very important to analyze what is the reason of the changes, and to check all the factors. A decline of Nitrate level in the soil solution may be caused as a result of an increase in the plant's consumption for Nitrate. A rise of Nitrate level can testify to an irrigation discipline with too small amounts of water, or to a decline of the plant's ability to absorb Nitrate (as a result of a strong pruning, lack of ventilation in soil, diseases, etc.). A rise or a decline of Nitrate level affects the Electric Conductivity level of the soil solution. **62 mg/liter (PPM) of Nitrate = 0.1 millimohs**. The ideal concentration of the Nitrate (NO_3) in the soil solution ranges from 100-400 milligram per liter (PPM), according to the type of soil and plant. Most plants fall within this range, developing and growing to their maximum potential. In higher ranges, too much Nitrate will be absorbed – that is, fertilizer is wasted, a costly expense, offering no benefit to the plant. For example: an appearance of a deep purple color at the test strip within 10 seconds indicates a Nitrate level that exceeds 500 PPM. A saving of Nitrogen-based fertilizers is an advantage for the plant. When the irrigation schedule is proceeding to short intervals with small quantities of water, the Nitrate level and the E.C. of the fertigation system should be lower than the normal level, in order to avoid accumulation at the upper root zone, as a result of external drying process.

Nitrite – NO_2

When the soil is deprived of adequate ventilation because of too much water, the Nitrate (NO_3) becomes, in part, Nitrite (NO_2) which is poisonous to plants. Irrigation cycles must therefore be at suitable intervals in order to give the soil air, eliminating the poisonous Nitrite and transforming it back into its Nitrate (NO_3) form. In addition, the amount of water in the irrigation cycle should be decreased in order to prevent over-irrigation.

pH

The pH level of the soil solution is a major factor affecting the availability of the microelements to the plant. When the pH is high (above 7), it is difficult for a plant to absorb microelements. However, when the pH is between 5.5-6.5, all of these, in particular, phosphorous, as well as the elements appearing in the soil in a solid form, will dissolve and become soluble – enhancing their availability to the plant. The result is substantially lowered standard fertilizer requirements, whose costs are particularly high. In order to maintain the ideal pH level, acidic fertilizers should be used, when pH level in the soil solution is above 7, making it of vital importance to know the pH level of the soil solution and take the appropriate measures.