

Analytical Sampling Recommendations



(March, 2023 – T Eden, HCT, LLC)

Purpose: Improved “Legacy Test Methods” reveal stunning levels of both nutrients and toxins that are actually within the treated water you apply, and that have accumulated in the soil. Typically, this is nutrition from water and fertilizers that have accumulated in the soils and are no longer available with current methods of treatment, including just lowering pH with acidification. HCT’s WaterSOLV™ chemistry will break down these soil accumulations and make them available to your vegetation, thereby reducing the levels in the soil, thereby restoring the porosity, pore space, infiltration depth and rate, for soils to operate more effectively for robust crop vitality and production. Eventually this process will lead to the need to replenish soil nutrition versus the current methods which cause more nutrients piled on top of existing nutrients that are already hindering soil porosity, health and harboring toxins (Na, Septic Water, Cl), crop production and vitality. Soil and water ingredients allow us to identify the demand for treatment to liberate nutrients (minerals and metals), to detoxify sodium and chloride, to mitigate bacteria exudates, challenges faced by iron bacteria slime and sulfate reducing bacteria (black layer, root rot) acid and toxicity. No if’s, data tell us what’s needed, the outcomes are predictable. Harvest the accumulated nutrients, the water nutrients, grow more with less at relatively basic pH values.

Water and Soil Sampling (Your bags, your bottles)

Water & Water Bac T:

Water is a site-specific blend of beneficial nutrients, but then also toxic sodium, chloride, and likely bacteria that can grow and produce toxins and biofilms. Plants need the beneficial nutrients, but they also must get oxygen and protection from the toxins from their water and soil to the roots.

For these tests, be sure you are taking a sample of the untreated source water, at the source where it begins delivery to your vegetation. Be sure to get a good representative sample, not water that has been sitting in a pond an unusual amount of time, or from the initial water coming from a well. We really need to test the typical water that the system will deliver to the vegetation.

Available Soil Nutrition:

This is what a water sample from your facility, the water you use, will produce from the soil sample you provide. So, it not only involves a specific soil sample, it also requires a treated water sample. Bold items below are recommended. Using the actual treated water, you plan to use, will provide the most accurate results. If we need to add the estimated WaterSOLV™ Treatment to the water, we can, AFTER we do the water analysis and water Bac T analysis. This is very important, as the amount of soil nutrition either not available or made available with treatment, is sufficient to offset the sodium percentage which should be well under 20% and usually isn’t.

Results will pose questions! If I have nutritional deficiencies in the Available Soil Nutrition results, if you have plenty of that/those nutrients in the soil in the total digestion test, do you add more of the nutrient to get it to your plant, or do you increase the treatment dosage to release more of the nutrients from the soil (and or to lower the percentage of sodium)? Remember, consuming from the soil, opens more soil pore space.

1. What Water	2. Soil Characteristic	3. Soil Tier (depth x to x)
Untreated site water	Good Soil, overall	Crust
Treated site water	Bad Calcareous Soil	Overall root zone
Site Water Treated with HCT WaterSOLV	Bad Boggy Soil	Root Zone Layers
Other	Problematic Spots	Sand Based Green tiers
	Other	Root moisture zone
		Confining Layer
		Other

1. Every Available Soil Nutrition soil sample should designate the water, the soil characteristic and the soil tier (inches).
2. Soil Tier should be soil from the root sone, and root zone variances, if any, if deemed needed.
 - a. Example; tier 1 versus tier 2 of a sand-based golf course green to determine what the treated water will liberate and or doesn’t, and what needs to be done, confining layers, bio, calcareous, toxic, etc.).
3. Confining soil samples, if a layer, should be taken horizontally. If the confining layer has depth to it, then a core from its depth alone should be taken.

Total Soil Digestion:

What minerals, metals, toxins, are in the soils root zone, in its entirety, to be liberated with treatment, and harvested with the treated active water?

Samples should be taken from the soil in the root zone that is moist, and or additional samples where it is dry, perhaps a crust, or a confining layer which is relevant to the existing and desired root zone. Confining layers are associated to holding toxins, which usually require additional treatment doses once the chemistry reaches those areas.

Packages:

(All soils less thatch but try to include organic matter. Remove thatch in bag and retain all soil and matter other than roots and tissues)

Mindsets:

- 1) When we water, what is the water actually putting onto the soil other than the water; what amount of beneficial or toxicity, nutrition, sodium, biology, cementation? While it is all lbs/acre, the biology can grow in the soil exponentially, and every 15 minutes building infiltration restrictions.
- 2) When you put "treated" water onto the soil, what does it release for the plant to drink? Is it releasing enough beneficial nutrition and offsetting the percentage of sodium? Is it releasing enough nutrient where there are no deficiencies? Need we increase the treatments to liberate more nutrients or to overcome biological issues? (Is there enough of the nutrients in the soil reserves (Total Soil Digestion), that we need to increase the treatment level to liberate them into become "available soil nutrition", versus locked up in the soil.
- 3) "Total Soil Digestion" – How much is there hindering my infiltration, possibly feeding problematic bacteria, tying up nutrition with chloride and releasing sodium from chloride when watering? How much do I have in reserve that I need to liberate and consume. Why flush beneficial salts, why not release them and let your vegetation drink them? If you have infiltration, the 1st salt to flush is N, then sodium, the last are the beneficial cations and iron. Likewise, if watering, the first salts to be drunk are Oxygen, then water and nitrogen, followed by toxic sodium. Then should come the beneficial cations and iron, but they usually don't because they aren't soluble without adequate treatment. The plant needs them – so if you add more, while you may feed the plant, a big percentage of the nutrients get left behind further adding to the soils saturation and inability to provide pore space and infiltration.
- 4) Confining Layers in the desired root zone – do your best to find them, and isolate a soil sample of it from a horizontal soil sample. These reports will usually show super accumulations of the elements with significant amounts of bacteria food sources (Fe, Mn, Zn, Sulfur and Sulfate).

Every Application: 1. Each Water Source

Irrigation Water - Untreated

Bac T - Irrigation Water - Untreated

2. Good Soils

- 2 each root zone soil samples; 1 for Available Soil Nutrition and 1 for Total Soil Digestion.
- Include water sample, and define what the water is;
 - raw irrigation water
 - treated irrigation water
 - raw irrigation water
 - to be treated with HCT based on water analysis.

"Root zone soil sample" whether just an inch or 4 or 12 inches. If greater than 12 inches take samples from the top tier then a separate sample from lower tier. Likely no confining layer because it is good soil. If so, dig an open area to take a horizontal sample of the confining layer and submit for Total Digestion.

3. Bad Soils

- a. If you have turf or product, you want to do the same as Good Soils
- b. If you do not have turf, you want to do the top 2 inches for Available Soil Nutrition, then the lower 2 to 6 to 12 (depending on your plants desired root zone) for a Total Digestion.

4. USGA Sand Based Greens

- a. Usually done in 4-inch tiers which is recommended for good soils that are working.
- b. For bad soils, use an infiltration pipe to identify the depth of a constricting layer.
 - i. Submit the upper zone as one sample, and the constricting zone and tier as another sample – both for testing by Available Soil Nutrition and Total Soil Digestion.

The documentation of the form and samples are critical. The notations on the form are critical as well. While we can qualify and quantify the elements (minerals, metals, sodium, bacteria, ...), we can qualify or quantify the bio – exudates of biofilms, sulfate reducing bacteria and septic water in soil (yet).