SOIL REPORT ANALYSIS SUPPORT DOCUMENT

	DESCRIPTION
TEC	is not an accurate metric for potting substrates. The way this is determined will give erroneous targets for potting substrates.
pH	Any amendments added for pH management must be thoroughly incorporated throughout the entire soil profile. Whether you are going to move your soil up or down it is crucial that the amendments are worked into the entire soil volume homogeneously. Otherwise, you risk setting up pH zones in your soil and nothing will grow. If you are deciding between wollastonite and ag lime to bring your pH up keep in mind that ag lime will move the needle faster while wollastonite brings in beneficial SI. Si helps with nutrient toxicity partitioning, limits heavy metal uptake and reduces pest and pathogen pressures. Choose the amendment that fits your scenario and needs best.
Organic Matter %	Organic matter percentage, like TEC, is not designed for potting soils. Anytime you hit 2-4% in a field grow you are doing quite well. Our reports almost always come back at <20%. You won't find anything close to that in the very best farming soils. While I track this metric to see if I feel like I should add compost or worm castings you can ignore this number. Keep in mind that soils with high organic matter % will break down over the course of the cycle at a faster rate, typically leading to less soil when you go to reamend.

Phosphorus #P205/A	Most tests are reported as ppm phosphorus. As with all elements, to get from ppm to pounds per acre (that our target is in) multiply your ppm x 2. This will give you pounds per acre of P. Our target is in pounds of P2O5 per acre though so multiply again by 2.3. For ex. if your phosphorus is reported as 200 ppm multiply 200 ppm x 2 = 400 #/A of phosphorus. To get #/A of P2O5 multiply by 2.3. 400 x 2.3 = 920 # of P2O5 per acre. When incorporating phosphate amendments be sure to incorporate them very thoroughly, as you would for pH. Phosphate is highly reactive and only moves 0.5" in your soil on its own. It is imperative that this gets down into the soil where your roots can intercept it. Phosphorus is needed for energy production in your plants. Your roots need ample P in order to spread out in your beds for uptake. We rely primarily on large reserves of phosphorus and regular applications of phosphorus solubilizing bacteria to proved our available P targets. Fishbone meal is a great phosphorus source but requires careful management as it also brings in ample nitrates. By managing your nitrates appropriately you open the door for improved phosphorus availability. We also use soft rock phosphate for P. Soft rock can bring in heavy metals, specifically arsenic, so be careful to get the safest source you can find. Currently, the California heavy metals registry has Calphos as having the lowest As metric.
Cations	I use the Paste Report to determine actionable data for cations. However on the standard test, I set loose targets around 4000 for Ca, 350 for Mg and 600 for K. This will get you to sufficiency and keep you in balance but don't get too hung up on these metrics. Always check your Mehlich III percentages to see if Mg is above 10% and see where sodium lands. If it is competing with any of the productive cations we might have an issue to correct. If your Mg is above 10% you can skip it for now. More on this on the Paste Report under Magnesium.
Sodium	Sodium is a cation but it is a "bad actor". Sodium is not needed by your plant and any sodium in the soil acts to interfere with the uptake of productive cations, especially potassium. Often, we see with tissue and soil that potassium deficiency can be caused by Na antagonisms even if it is in sufficient quantity in the soil. Anytime

	your Na gets above 200 it is advisable to flush the soil. To flush with the greatest efficiency prepare the beds by getting them to field capacity. We want the bed to be thoroughly wet so that the run off isn't just passing rapidly over the surface. Using a surfactant to reduce the surface tension of your water will help to penetrate the beds as well. Once you are at field capacity begin to flush your beds with clean water (no sodium chlorides or heavy metals) until you have achieved 10% runoff by volume. For example, a typical 4 x 4 with 10" of soil depth should hold approximately 100 gallons or ½ yard of soil. To flush this bed you would want to catch at least 10 gallons of water. Alternatively, for more control you can check the EC of your runoff until you are down by 50%. Follow these same instructions for any flush regardless of the ion you are trying to move. At the end of a flush it is a best practice to add some beneficial biology. Soil without plants is missing some f its immune system already. Then we are adding a very large volume of water that will dry down slowly without plants. That leaves a window for fungal pathogens (fusarium, botrytis, pythium, PM etc) to take hold. Applying trichoderma or LAB liberally at the end of the flush will prevent this from being an issue.
Exchangeable hydrogen	Exchangeable hydrogen is just another way to look at pH. You can ignore this. I have seen folks setting targets for this but they should address their pH and ignore this metric.
Trace Elements	Be careful chasing a "perfect" trace element metric. There is almost always plenty of trace available through contamination from water, compost, earthworm castings, rock dusts, or kelp. The margin for error between a perfect metric and dead plants and ruined soil is hard to achieve in a field with an enormous buffer so it is dangerous territory in raised beds or pots. Proceed with caution. It is my opinion that these should be left alone unless a specific deficiency tied to one of the trace elements shows visually or shows on a tissue test. Be careful that you don't lock out your other trace elements. Do not add any additional trace elements without tissue tests or a visible symptom. If you believe you are dealing with a particular trace mineral issue let us know.

Ammonium	Ammonium levels let you know how stable your soil is and if your nitratrogen has cycled to nitrates. As long as your ammonium number is under 1 you should be temperature stable and have little to no additional nitrate release. Keeping this number below 1 or 0.9 gives us confidence that we can address your nitrate needs without additions later and it tells us whether the temperature of the soil is stable or not. If this number goes above 1 it is almost always from a liberal addition of compost or vermicompst. Sometimes it will present in water logged soils. If you re above 0.9-1 you need to turn your soil and check it as you would compost to see when the soil becomes temperature stable. You can use your hand but I prefer a compost thermometer or laser pointer for better control. Heat from microbes reproducing and cycling nutrients can get quite high, high enough to kill tender roots so be are your soil is stable before planting.
Nitrates	Nitrates are one of the most important metrics on these reports after pH. I like to see nitrate around 65-70 pounds per acre at the end of a run with a target around 150-200 for a full round. This makes my phosphorus management easier as well as noted above. Anytime N drops below 30 pounds all growth stops but I get equally concerned anytime a test goes over 200 pounds for an indoor run. Do not over apply. Excess nitrate at harvest diminishes terpenes, reduces yield and delays senescence. It also makes the plan more subsceptible to pests. It is always a best practice to multiply nitrate inputs for optimal release rates. We can provide metrics dog r you for a list of nitrate inputs. My favorites are feather meal, soybean meal and alfalfa meal. Blood meal, crustacean meal, neem meal, karanja meal, and cottonseed meal (if you can find an organic source) are all good sources of N as well.
Soluble Salts	Soluble salts can be looked at like EC. It is the total of all salts (acid plus a base) in your soil solution. We like to see this number up around 1000-1200 but be cautious relying too heavily on this metric as bad actors like Na or Cl can inflate the metric while not helping the plant at all.
Chlorides	If chlorides are high it is almost always from your water or compost source. Chlorides can block a bunch of productive elements so it is critical to keep it as low as possible. I have seen a bunch of tests coming in with really high chlorides lately. If you have a clean water source you can flush just as you would for sodium above. In a perfect world we

	recommend flushing when chlorides hit 200. Keep an eye out for antagonisms. Mn is usually the first to show up on the top of the plant with chloride issues. If your chlorides are consistently climbing round after round get a water test.
Bicarbonates	Bicarbonates are rarely a problem if you have a decent water source. If your bicarbonates are accumulating you should get a water test.
Sulfur	We want adequate sulfur for building our volatiles; esters, alcohols and terpenes. Sulfur is crucial to the "nose" of your plant. We get a lot of available sulfur from our sulfates for cations. Sulfur will form sulfuric acid and have a gradual pull down on your pH. I normally see high pH and cations. Now that we have reduced sulfur emissions we find ourselves needing to add sulfur.
Available Phosphorus	Available phosphorus is one of the hardest metrics to manage in organic living soils. It takes a lot of energy to break the phosphate triple bonds so phosphates tend to stay tied up. Adding a very large reserve as we discussed above is the first step to meeting your 2-4 ppm target on the Paste Report. The second and crucial step is making sure that you are running a phosphorus solubilizing bacteria weekly. Again, the phosphate bonds are too strong for the relatively weaker plant exudates to break down so a targeted bacteria is needed. Microbial Mass and Mammoth P are two great examples. If you have an adequate reserve but low available metrics be sure to run some P solubilizing bacteria each week. Other ways to get better soluble phosphate is to use fish hydrolysate of pH down your water with phosphoric acid. Guanos also tend to raise available P levels.
Calcium	Calcium should be relatively easy to manage. Gypsum is a great calcium source and it will not pull your pH up making it easy to apply. I like to target calcium around 200 ppm. It is hard to have too much Ca but be cautious adding additional calcium to balance elevated magnesium (a common practice). This brings in a lot of osmotic stress and is not good for your plant. Calcium is a large element and it travels only in the xylem, meaning it is relying on evapotranspiration to carry the calcium up into the plant. For example, if the VPD is off or your fans are pushing too high of CFUs across your plant you will see calcium deficiency symptoms regardless of how much calcium is available in the soil.

Mg	Magnesium is the bully cation and will outcompete both Ca and K it is important to now over apply. Keep your eye open for Mg deficiency later in the round. If you see interveinal chlorosis on lower leaves add 2 tbsp epsom per gallon of water and add to the soil as a drench as a one or two time application. Only add if there is an issue. Limit Mg inputs for cation balance. I see a lot of growers adding Mg and or Ca/Mg without a purpose or metrics. We want to limit our expenditures and prevent waste and or environmental impacts at every opportunity.
Potassium	Potassium does so many things it is really important to get this into the plant in the vegetative phase. I consistently see this metric low across all tests. Because of this I recommend amending to match your target as a preplant amendment but also adding an additional 0.5 cups per yard of potassium sulfate after week three of stretch. High Mg and Na can easily block potassium so managing those elements will improve your potassium uptake.

Additional notes:

We hope these recommendation support notes help you get dialed in for a great round. Thanks for supporting KiS Organics!