

Urban and Small Farms Conference – March 1st 2021

Soils & Water Session (afternoon)

**Presentation slides, handouts, and other materials used in the session are available on the [schedule page](#)*

***Video recordings of the sessions will be available on [diverseag.org](#) soon*

Salinity and pH

1. When do you want to use an electrical conductivity meter vs. having a soil test done?
 - EC from a probe is good for undisturbed field readings. A soil test can provide components of salinity and that is sometimes important. Undissolved elements such as gypsum will show up in a lab test, but will not always show up in a field test. For a few samples, a lab test is more feasible.
2. With a small home garden, if it is economically possible, do you recommend avoiding this whole soil salinity problem altogether and just buying raised bed soil? Or is it feasible to chip away at the problem with added organic matter and the other methods you've recommended, and if so, how many years will it take to get the soil to a satisfactory range?
 - I would leach the soil with sprinkler irrigation if possible. I would put on 6 inches to 12 inches for highly saline soils.
3. We have a water well (18 feet) that we water our acre of berries; it has a high saline pH 7.9 Electrical Conductivity (salts) 3.6 Mohs. Any way to mitigate?
 - You can try to keep the soil quite wet, without being saturated, and see what happens.
4. Are there crops that can reverse salinity in the soils?
 - Those that have fibrous root systems can help deposit large amounts of organic matter in the soil matrix that can aid in structure building and open up the soil to leach. But uptake of salt, no.

Fertilizer and Soil

1. I was wondering if any field crop can be used as a cover crop/green manure if re-seeding is not an issue. For instance, at the end of my zinnia or snapdragon season, can I cut the plants at the base and leave the green material on top of the bed to brown out and act as mulch?
 - Yes, as long as the plant material is not diseased, it can be an excellent mulch that adds organic matter to the soil. If it is diseased, it should be removed.
2. Can you please speak briefly about the development of a caliche soil layer which we see so often in the arid west? Any way to bust it up other than mechanically?
 - Caliche is kind of a catch-all term for a hard pan. It can be a high accumulation zone of calcite, or lime, that hardens/cements over time at depth. Sometimes, a layer of high gypsum (Calcium sulfate) can also create a similar layer. Typically, these are only remediated by ripping and breaking them up and adding lots of organic matter to help create aggregates that are less likely to reconsolidate.
3. Can you talk about any merits of humic acid as a way to increase soil fertility (not necessarily as a fertilizer)? In situations where it's unwise to continue to add compost

(increasing phosphorous and potassium), does humic acid play a role in increasing soil health, fertility, or organic matter?

- Humic and fulvic acids, or humates, are organic materials. But they are unique in that they do not breakdown any further in soils. Raw organic materials (like composts, manure, etc.) as they decompose, release the materials that create and maintain soil aggregates that open soils up and help with drainage and aeration. Humates don't provide that service to soils. They can help increase exchange sites to hold nutrients and water in very sandy, coarse soils, but in most soils, you can't add enough to really change that property. Best to add raw organic materials that provide the soil structure building services to soils and also feed soil microbes (humates don't even provide microbial food as they are not readily decomposable).
4. What is the typical margin of error associated with fertilizer component analysis (e.g., a 20-0-0 being 20% N)?
 - The standard lab error for these kinds of analyses is within a fraction of a percent. But you can know it pretty easily simply from the chemical structure. For instance, Ammonium Sulfate is $2(\text{NH}_4)\text{SO}_4$, which means that there are 2 N atoms, 8 H atoms, one S and 4 O atoms. We can look up the atomic mass of each element and determine the actual percentage of N by weight, which is 20%.
 5. How come USUAL doesn't test for nitrogen? Is there a way to know how much residual (insoluble) nitrogen is in the soil so that you can know how much soluble to add?
 - N is so highly competed for that we know we are going to need nitrogen each year. If you include what you are growing, the lab will provide an N recommendation, even though we don't regularly test the soils in a routine analysis.
 6. I've heard of adding wood ash, like from a wood burning stove, to your soil as an amendment. Is that good or bad for your soil?
 - Wood ash is what is left over after rapid decomposition (burning) and is mostly mineral salts that were in the cells of the tree that don't burn. Ash is therefore a very concentrated salt. It is high in potassium, but you probably don't need K in our soils.
 7. I had a recent soil test and had high P, and K. Salinity was 4.4. I was thinking I would add dairy manure (1-2 yrs. old) for N and organic material. If I did that it looks like I would dump a lot more P and K along with the N and increase salinity. I was going to flood it with water, but wouldn't that also leach out the N?
 - Additional P and K will not really be a concern. Being an aged manure, it has likely been leached of salt, but that could be a worry in a dairy manure, especially. If the manure is low in salt, this could be very good to promote structure development and N, allowing for removal of the salts. The N in the manure is largely in organic forms, so your loss will probably be about 15-25% of the total N. The organic matter benefit to structure building and maintenance are probably the more important aspects to consider.
 8. What are "biosolids"?

- Biosolids are processed human waste.
9. Is the potential for weathering (oxidation) of insoluble nutrient sources another possible argument in favor of tilling?
 - Our dry, temperate environment is not really conducive to weathering of minerals to a great extent. The boost we get in tilling is often due to increased organic matter decomp that releases some nutrients and brings nutrients that were below the uptake zone of previous crops to the surface and makes them available to the subsequent crop.
 10. Is any of the P in compost available immediately? In a soil very low in P, where the compost could provide all of the needed phosphorous without putting other nutrients out of balance, can compost be the only source of P added to the soil?
 - Yes about 75% is available right away. Adding compost to meet your P need and then supplementing the rest of the N is an excellent, sustainable management practice.
 11. What would you say the period of time is during colder soil conditions for blood meal to become available to spring crops? Longer than "a few weeks?"
 - It's C:N is low (3.1), which means it can break down relatively quickly. However, when soils are cold, microbial activity decreases exponentially. I haven't found a study that goes down to very low temperatures, but here is what happened at 50F: in 1 week, about 18% is released, 2 weeks 47%, 4 weeks 52%, and 8 weeks 60%. By contrast, at 80F, 50% is released in a week, 60% in 2 weeks, 67% at 4 weeks, and 70% at 8 weeks.
 12. Can you share the information on how to get the soil tested at USU. Website?
 - soiltest.usu.edu
 13. I assume elevation and slope aspect influence ET. Are there any rules of thumb for estimating changes in ET as a function of elevation or aspect?
 - I would adjust the reported values, up or down depending on the aspect or microclimate. If it's only a slight slope I wouldn't do any adjusting.
 14. Is it possible to quantify soil moisture percent from gypsum block measurements? Would that involve a unique calibration for each soil type?
 - Older style gyp blocks generally require individual calibration. Watermark resistance sensors have better uniformity between production batches and come with a batch calibration.

Irrigation

1. When choosing a drip irrigation system like Netafim, what would be the different situations where you would use 12mm vs 17mm, assuming the same 12" emitter spacing and flow rate? Or is it personal preference?
 - If diameter, flow capacity would be the determinant if you have very long runs (more than several hundred feet). For garden or small areas, it's a preference issue. Wall thickness is more important to consider if there is lots of cross traffic over the line. In a garden, that's really not a big determinant either.
2. Any thoughts about grey water collection for irrigation?

- It can be used, but you have to be careful with some of the other chemicals that come with it. Some detergents come with phosphates to help with cleaning and can accumulate in the soils.
3. In what way is the Jordan River "bad"?
- The water is good water. Of course, for culinary use it requires treatment for various undesirables (sediment, biologicals, etc.) but for irrigation, it is generally quite good.