

Blue Ridge CRAFT

Understanding Your Soil: sampling, interpretation, and management Workshop

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Links to Share

- [Seven Spring Farm Supply](#)- check them out for soil amendments and supplies!
 - Agronomic Services - [Soil Testing Information](#)
 - [Understanding your Soil Test Guide](#)
 - Guide to soil testing handout
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Presenters

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Welcome!

Not sure why your pasture isn't recovering between rotations, or why your crops are growing slower? You may need a better understanding of your soil. Participants will leave this session with a soil testing kit, and will understand how to sample soil, interpret the results, and utilize local resources to further their quests for stronger soil. Light dinner will be provided thanks to our sponsors at Seven Springs Farm Supply!

Richard Boylan on Soil Testing

- Soil testing labs are run by the Department of Agriculture
 - They use acids that closely simulate what roots do to the soil to analyze components
 - Check out the NC Department of Agriculture website! Great resources and publications. [Link](#)
- **Soil Sample Submission Form Handout**
 - Takes about five or six weeks to receive results (as of late)

- NC labs are generally just as accurate as private labs when it comes to soil analysis
- Fill out basic information; don't worry about agent or advisor section
- An acre of soil about six inches down; two million pounds!
- How to sample:
 - Sample box only holds a pound, with only a few grams being analyzed
 - Make sure to only sample one specific area for accurate results. If measuring multiple areas (ie, the bottom versus the top of a slope) use separate samples
 - Use a clean shovel and clean plastic bucket (metal will throw off results) to gather 10-15 different scoops of soil across a consistent sample area and mix it around in the bucket to produce **one** sample to send off for that area
 - Be clear in your labeling so you know which sample is which for your records
 - List two crops under the crop section for recommendations. For example, if sampling soil to make an apple orchard, list the apple numeric crop code to receive specialized recommendations and the second crop as something that's helping to maintain the orchard, like a cover crop
 - The crops aren't a big deal, but will help you if you have specific things you want to plant in your soil
- Can you get the soil to do what you need it to do without spending too much money?
 - Be conservative and careful with nutrient amendments
- **Looking at your soil report**
 - First bar: What they recommend for your to do to your field to get your crops to grow successfully
 - Second bar: what information is informing the recommendations
 - Extension agents can help you figure out the math for exactly how much of the amendments listed to add
 - Humic matter (HM%): an important aspect of your field. Good dark organic matter (about a third to a half of your organic matter)
 - Cation exchange capacity (CEC): "Parking spaces" for your soil nutrients (calcium, potassium, magnesium)
 - It's good to have a high number but no more than 20
 - BS%: How many of the parking space are occupied by base ions
 - Acidity (Ac): Best tested in a lab for wild soils.
 - pH: Should be around 6.5 for most crops.
 - Easy to gradually change pH using lime or sulfur, but don't use all of the recommended amount at once or it'll shock the soil. Gradually add yearly

- Crops can only absorb nutrients properly when the pH is right. pH is important!
 - Other nutrients (Potassium, sulfur, sodium) use indexes to show how happy (100) or unhappy (0) your crops would be. These numbers are pretty accurate and important to pay attention to
 - Sulfur numbers can be questionable for a lot of reason (poor soil ingredient)
 - Phosphate tends to be low in the mountains, but isn't very mobile and will stay in the soil well
 - Nitrogen will often wash away
 - Sodium is mainly a concern in high tunnels because it builds in the evaporation in a closed system
 - Calcium and Magnesium: Relayed in percentages. Calcium and magnesium are added to lime it, but generally add way more than the plants need. Get the pH right and balance the calcium and magnesium. **What you want** is the claim number to be 65/70 percent, magnesium 10/15 percent, and manganese index at about 100
- Are the relationships between these data points universal for whether the crop will grow or not?
 - The numbers might change depending on crops but generally yes minus a few outliers
- Soil testing only gets you so far! Soil testing doesn't account for erosion, soil biology, or soil structure
- Trust your own senses; smell, taste, vision can guide you too
- We are in a high manganese community in the mountains and always have more than we need. Only toxic in high amounts but can be mitigated by pH control

Alex Grey: Biochar & Kiln Rentals

- Biochar: start out with wood and heat it in a low oxygen environment. Then you end up with biochar!
 - Super light and porous, 80-90% carbon
 - Some hold water and air, some hold nutrients, others enrich soils with bacteria, mycelium, and arthropods
 - Hotel for good soil aspects
 - Helps add air, drainage, and prevent erosion in soils
 - **Not a fertilizer**; can prolong the effects of fertilizers and nutrients but is more of a vessel for nutrients to stick to
- Biochar in the Amazon: *terra preta*
 - Soils are often super compacts and hard to grow in

- Some sites found with black carbon found alongside potshards
- Ancient people were combining wood ash with human waste and potshards, permanently changing the soil for better growing
- How to make biochar
 - Open pit; putting a bunch of organic matter in a fire pit that prevent oxygen from reaching the bottom, making biochar
 - Feedstocks (what you use): wood, plant matter, organic waste
 - Charging biochar: mixed with manure and compost and it absorbs nutrients *then* becomes more of a fertilizer; 10/50 percent by volume finished compost mixed with biochar
 - You can also steep in liquid amendments or compost tea
 - Applying biochar: Mixing it with the top six inches of soil using a hoe or broadfork. 1-50 tonnes per acre
 - Start small to gauge effects on soil (test it!)
 - Designer biochar
 - Particle size is important depending on what you need. You can also use different types of biochar (bone/manure/wood) for different things
 - Other uses; kills smell and absorbs ammonia when use in animal pens, also charges the biochar at the same time. Good perlite replacement
- What to expect with biochar
 - First year with charged biochar: not huge results but slightly higher yields
 - 1-3 years: greater nutrient retention
 - Long term: sustained water and nutrient retention, greater organic matter accumulation, greater stability
- Add biochar every year?
 - Yes, but don't overdo it and keep testing soil. Only add as much as you would add compost
- Biochar and planet healing
 - Helps rebuild lost topsoil and quickly regenerate soils
 - Lasts a long time, made easily
- Difference between biochar and wood ash?
 - Wood ash is mostly calcium, basically lime
 - Made under different conditions
- Biochar kilns; trying to distribute and loan them out for free, Alex has a couple and is looking to build more
- Is biochar only DIY or can you purchase it?
 - Nobody around here sells it but it's starting to become more common. You'd probably have to make it as of right now
- How do you know when it's done?
 - It'll be basically embers and you just douse it.

- Survey

Mikey Lee on Erosion

- No point in building your soil if it's all just going to wash away!
- Main types of erosion
 - Rill erosion: small divots across a large area
 - Sheet erosion: a big portion of the soil will move, dip over a wide area.
 - Mostly caused by bare soil
 - Occurs on long steep slopes when it rains a lot
 - Impervious surfaces (no water can absorb, ie driveways and roads) worsen it
 - Gully erosion: most common; large deep channels
 - Gets worse over time and can create more gullies over time. Try to stop it early (tilling won't fix)
 - Driven by runoff
- Solutions
 - Residue management
 - Crop residues can prevent gullies and erosion from forming much better than bare soil
 - Stabilized outlets and water control structures
 - Crop rotation
 - Rotate between erosion prone and erosion resistant
 - Terrace or contour farming
 - Loses some land, but can be a good option on a large scale
 - Cover crops!
 - Prevent erosion by stabilizing soil with roots, among other benefits
 - Grassed waterways
 - Gives water somewhere to go
- Stream bank erosion (common in WNC)
 - Caused by many things, including
 - Impervious surfaces that increase the amount of water flowing into the streams rather than absorbing into the ground
 - Heavy rain events that are increasing due to global warming
 - Water also barrels over bare soils
 - Excessive stream debris
 - Lack of vegetation with roots strong enough to prevent erosion
 - Uncontrolled livestock access
 - Tillage close to the stream bank

- Important for farmers because it can destroy fields
- How to restabilize ***some things require special permits; talk to Soil & Water before proceeding***
 - Adding rocks to a bank **sometimes needs a permit*
 - In-stream structures ***Always need a permit!***
 - Removing stream debris
 - Plant native vegetation on banks
 - Exclude livestock from surface waters (barriers/fence)
 - Vegetative buffers
- Soil compaction (big problem on cattle farms)
 - Hard to grow plants, little nutrient access and drainage
 - Fixes:
 - Conservation tillage or no-till
 - Avoid working wet soil
 - Grazing management
 - Reduce traffic
 - Use a subsoiler
 - Plant cover crops
- Put good into your soil, get good out
 - Test and amend responsibly
 - Cover crops!
 - Add organic matter
- Takeaways:
 - Plan with water flow in mind
 - Maintain vegetation
 - Avoid concentrated feeding (livestock)
- Programs to use
 - Agriculture Cost Share Program: consultants come out and look at issues, can apply and get funded at 75% cost share (we can help you pay for things!)
 - AgWRAP: Don't have enough water around your farm? We can help at 75% cost share
 - CCAP: Not ag but a good resource to put in stormwater management practices at 75% cost share
- Does your office have a list of native vegetation?
 - Yes! Send Mikey an email
- Do creek permits include pumping water out of a creek?
 - No, just heavy equipment that disrupts the stream (like a tractor)
- Can you do consults for stream erosion?
 - Yes, but it's very expensive to address properly. But, there are plenty of things you can do on your own that we can help you with.