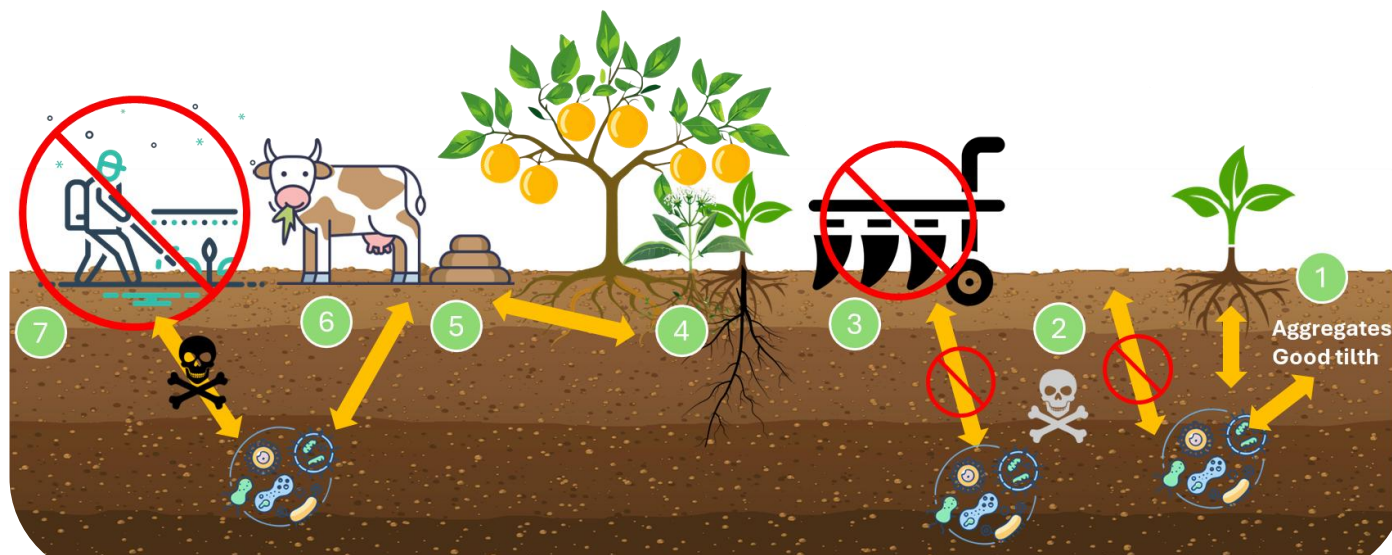


Soil Health: For Commercial Growers

TECHNICAL ADVICE SHEET

Soil health relates to the ability of soil to function as a living ecosystem that sustains plants, animals and humans. When we think of key principles for commercial growers there are many principles systems out there some which focus on 4,5 or 6 key principles but the one we suggest focuses on 7.



1. **Living roots** – Provide structure for soil and interaction with soil microbes which are key to soil structure and health
2. **Covered soil** – Bare soils lose structure and microbe benefits so should always be covered – cover crops/mulches/green manures etc
3. **Minimised disturbance** – disturbance reduces roots and associated microbe benefits and can have further impact on microbe survivability and diversity
4. **Diversity** – More diversity more interactions with microbes and structural role of roots in soils + different roots interact at different levels in the soil
5. **Feed soils** – Microbes in soil need food or they will start breaking down aggregates having negative impacts on soil structure
6. **Incorporate animals** – Animals provide natural sources of food for microbes and plants
7. **Minimise chemicals and synthetics** – Chemicals can kill beneficial microbes impacting soil structure whilst excess synthetic fertilisers make plants interact less with microbes potentially losing their benefits related to improving soil structure

HOW TO CHECK SOIL

Soil testing is one way to check soils but ultimately many say that the **level of aggregation in your soil can act as the biggest test of your overall soil health**, and aggregation isn't difficult to spot!

Spade test – try digging a hole, a spades width across and a spade deep pull out the soil and just look at what you find. Its easy to see the soil on the left is more open and less compacted.



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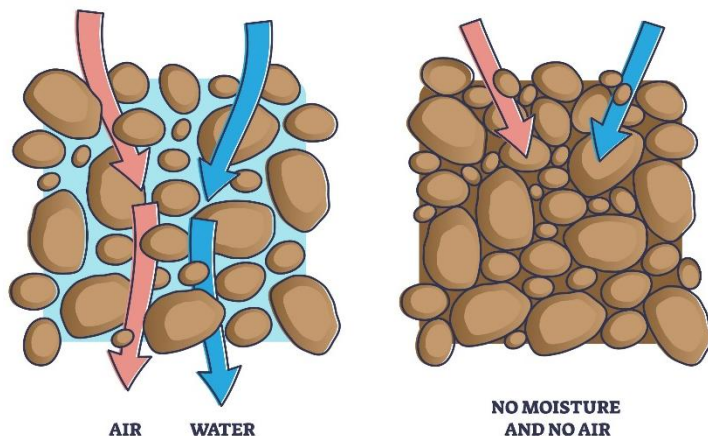


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Open soils with nodular clumps of soil, often close to the plant roots, show good levels of aggregation. Aggregates create these gaps, or pore spaces, that are great at helping your plants grow by;

- Improving gas exchange
- Improving water infiltration and ease of root penetration
- Improving water holding capacity



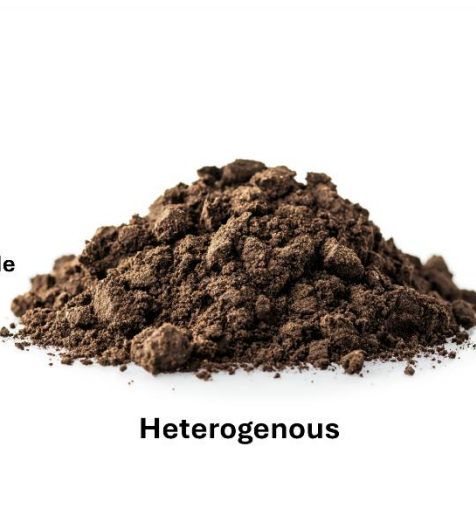
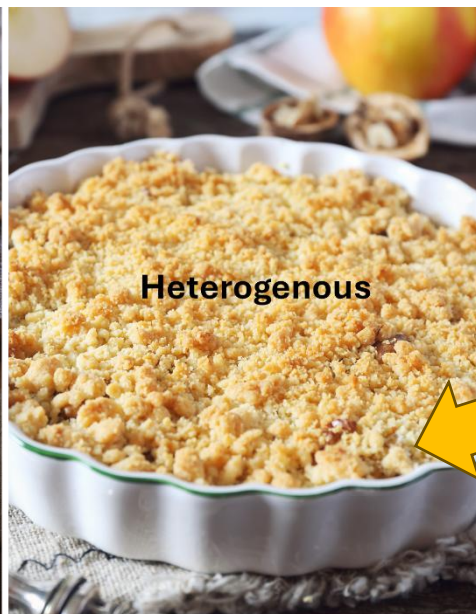
WHAT ARE SOIL AGGREGATES

Clumps of materials/minerals and organic components held together by chemical/physical forces but also by glue/gel like polysaccharides made by microbes. A good analogy to consider involves baking!

So healthy microbes = good aggregate formation!!

WATER SOILS AND CROPS

Soils that have good flow of water and water infiltration stop waterlogging and problems associated with lack of oxygen to plants and microbes leading to anaerobic conditions. Aggregates act on surrounding water particles via their larger surface areas to improve water holding capacity via capillary action help plants to more often than not have a source of water nearby to tap into and use.



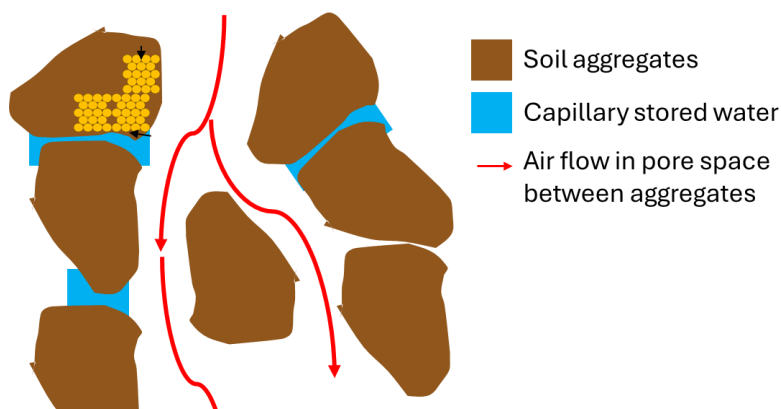
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Another important way to test your soils easily and practically is to **perform water infiltration tests** where you add a known amount of water to your soils and test how long it takes to infiltrate the soil and disappear – the longer it takes the worse your soil. See this [AHDB practical guide](#) for more information



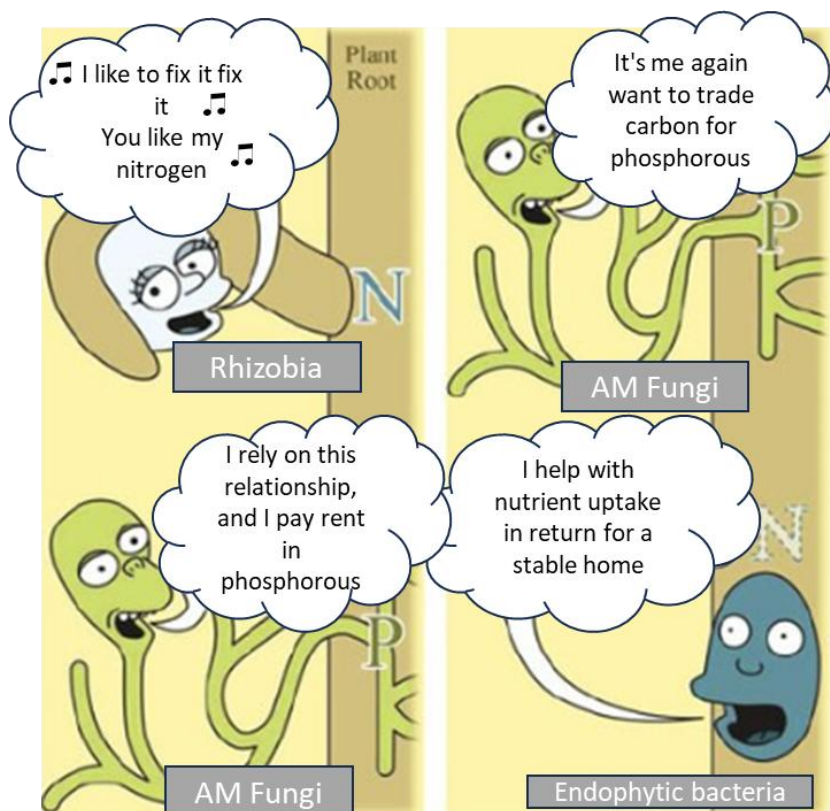
BENEFITS OF LEGUMES AND HOW THEY ACT LIKE AGGREGATES

When we think of soil health principles, legumes fit in well with keeping soils covered, keeping roots in soils and can work well in cover crop and intercrop mixes to help with diversity. They also have the added benefit of needing less “food”, due to root nodule interactions with nitrogen fixing bacteria that take nitrogen from the air. What you might not have considered is that this legume root nodule structures acts very similarly to aggregates of soil.

- They provide a protected space where microbes can accumulate
- They provide a low oxygen space allowing the enzyme in nitrogen fixation (nitrogenase) to be active
- They are both involved in fixing nitrogen from the atmosphere that plants can use

OTHER IMPORTANT MICROBE INTERACTIONS

By keeping roots in soils, avoiding disturbance, increasing diversity, avoiding chemicals and providing feed for soils we encourage other beneficial microbe plant collaborations. Mycorrhizal networks can essentially work to make an even wider network structure than plant roots which interact with roots to share key resources. This means nutrients and water from further away can be pulled to your plants to keep them healthy.



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AVOIDING DISTURBANCE AND KEEPING SOILS COVERED

These two aspects of soil health principles essentially go hand in hand. If we keep soils covered, then generally, we don't need to disturb them. That's why it is always good to think about using perennials. More and more food production advice is suggesting incorporation of perennial food crops and perennial additions via inter cropping for example.

However, for cover crops and leys, annuals can be recommended for use between cropping rotations as they can establish quickly preventing bare soils between crops as part of a regenerative strategy called the "5-minute fallow" – minimising bare soil time by planting as soon as the previous crop is out. Quickly re-establishing root microbe interactions.

GETTING STARTED

It can be important to get stuck in with practices that can improve your soil, so you can start to see what works. So maybe in your next growing year think about;

- Intercropping one growing bed or 2 half beds
- If you're using cover crops or green manures diversify one of these beds
- Try sheeting down one bed or 2 half beds
- Try mulching one bed or 2 half bed and
- Compare sheeting vs mulching see what works best in your situation

RESOURCES

- [Condition scoring of beef suckler cows and heifers](#)
- [Condition scoring of dairy cows](#)
- [Better returns from Body Condition Scoring \(BCS\) beef cows and heifers - fas.scot](#)
- www.sruc.ac.uk – Body condition scoring suckler cows
- www.nadis.org.uk – Condition Score (BCS) in Beef Herds
- www.fas.scot – Body Condition Scoring
- [AHDB BCS](#)



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