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Analyserapport for jordprøver

Type prøve: Jord

Fra: Eksempel utrekk fra biologisk analyse rapport

Uttak og analysert: xx.xx.xxxx

Please see the comments and information at the end of the report for information on how to interpret your results. We welcome all questions or comments you may have about the report so please don't hesitate to get in touch.

Fungi (sopp)	**1**	**2**	**3**	**4**
< 3um - ug/g soil (jord)	2.0	38.5	21.5	13.0
≥ 3 um - ug/g soil (jord)	39.2	125.2	92.2	47.6
Number of fungal hyphae fragments (ant. hyfefragment)	2.7	10.0	8.0	5.7
Spores (sporer)	0	72	0	24
Total evaluation of fungi (totalvurdering sopp)	**0***	**3**	**2**	**1**
*A score of 0 means the amount of fungi is too low				
Protozoa (protozoer)				
Testate amoebae (Skallamøber)	12	36	36	36
Round testate amoeba (Runde skallamøber)	0	12	0	12
Flagellates (Flagellater)	156	192	156	156

	1	2	3	4
Ciliates (Ciliater)	0	12	0	12
Cysts (Cyster)	12	96	12	60
Diatoms (Diatomeer)	0	12	0	0
Naked amoebae (Nakenamøber)	0	0	0	12
Amoeba cysts (Amøbecyster)	0	0	0	0
Nematodes (Nematoder)	0	0	0	0
Yeast (Gjær)	0	0	0	0
Number of groups (antall grupper)	3	6	3	6
Biodiversity Rating	0.5	1.6	0.7	1.6
Total evaluation of protozoa (Totalvurdering protozoer)	**0.67**	**1.73**	**0.84**	**1.69**
Total microscope evaluation (Totalvurdering mikroskopi)	**0.67**	**4.73**	**2.84**	**2.69**
Bacteria (bakterier)				
Approximate cells/field (antall/felt)	2000	1000	1500	900
Estimated micrograms of bacteria per gram of soil (Estimert ug bakterier/g jord)	960	480	720	432
Fungi/bacteria ratio (forhold sopp/bakterier)	1:25	1:4	1:8	1:9

Comments:

General

Most of the soils had more fungi and scored better than typical agricultural soil. All were bacterial dominant to varying degrees. Number 4 looked the most like forest soil but should have had more fungi and thus did not receive a high rating compared to the others. Number 1 was the most “disturbed” looking soil, with a high bacterial dominance and low counts of protozoa abundance and diversity, and poor structure.

Sample 1

This soil had the highest bacterial dominance. Bacteria were abundant and not noticeably active or diverse. There were almost no fungal hyphae and few other organisms besides bacteria, which suggests that this soil is at a very early stage of ecological succession and will likely favour short lived pioneer species (bacteria and weeds). While there were some large aggregates, the sample was physically very dense with fine particles and no clear space between particles. This indicates a lack of microbial activity that would otherwise bind most of the soil particles into stable aggregates.

Sample 2

There were a few motile bacteria, but not many and diversity seemed low. This soil had the lowest bacterial dominance because it had the most fungi. There was contrast and space between soil particles, but the spaces were mostly filled with fine debris and bacteria. Some medium and large aggregates and plant fragments. Fungi are mostly light; no dark brown hyphae were seen. Two types of ciliates and four types of flagellates were seen. While this sample received the highest overall score due to good fungal and protozoa abundance and diversity, there were some indicators that suggest this soil could possibly be holding high moisture or may have anaerobic conditions.

Sample 3

Bacteria were abundant with low motility and diversity. Soil has many coarse mineral particles with fine debris between. There were some medium and large aggregates, but the soil is generally loose with little open space, which suggests lower microbial activity that would improve structure. Mostly light hyphae, few brown. Four types of flagellates were seen. Overall there were very few organisms seen in this sample which in combination with higher bacterial abundance and low fungal diversity suggests an early stage of ecological succession and/or high disturbance.

Sample 4

Bacteria were least abundant in this sample, with some diversity and motility. This amount of bacteria is considered a sign of better balance, and is closer to what we would typically see in forest soils. The soil had better contrast and was slightly more organic looking, but it only had a few large aggregates. Forest soil typically has very large aggregates, large fungal networks, and very little “clutter” consisting of loose fine debris. This sample did have better aggregation with somewhat more clear space than others, and more diverse fungi, but the fungal abundance was low. There was good flagellate diversity as well, with six different types of flagellates, and naked amoebae. This soil also had some of the same types of testate amoebae that we typically see in forest soils. **Overall this was the best looking sample; it was more balanced than the others, but because there was relatively low fungi it did not receive the highest score.** With more fungi and larger aggregates this would look like natural forest soil.

Har du spørsmål eller kommentarer om jordprøver, ta kontakt med Katelyn Solbakk, katelyn@vitalanalyse.no, mobil 988 53 619 (skriv på norsk, snakk på engelsk).

About our microscope analysis

*** Note: this is a condensed example of a report. A more detailed explanation of the assessment criteria and soil organisms is included in a full report. ***

Soil microbes inhabit the thin layer of water that surrounds soil particles. In order to observe the natural microbial population as accurately as we can, soil samples are mixed with water and then allowed to “rest” for two days. This allows organisms that may have gone into a dormant state to emerge. A drop of the sample is then observed using a light microscope at 400x magnification. We look at a continuous strip down the center or most representative area of the slide, counting all organisms seen in that area. This is repeated a total of three times per sample to achieve greater accuracy and representation of the soil.

The primary focus of our biological analysis is to estimate the abundance and diversity of organisms in the soil, which gives us a picture of the ecological health. We also take notes and make some comments on the physical appearance of the soil including aggregation. There are some physical characteristics of the soil that we consider positive signs and indicators of healthy microbial activity, such as lower density in combination with good aggregation (clumping) of the soil, and a generally bright, “clean” appearance in the microscope.

Why biological soil analysis?

The activity of a robust community of soil organisms contributes to better soil structure, good water retention and drainage, nutrient cycling and retention, erosion resistance, resilience against pest and diseases problems, and better growing conditions for plants.

Evaluation of your soil at a microscopic level gives you valuable insight into the health and resilience of your soil ecosystem, which can help you to make informed decisions and improve your soil management strategy.

What are we looking for?

In the most ideal soil, organisms from all listed groups would be detected and there would be some diversity within the groups (eg. not just one type of flagellate).

Most agricultural soils that we see tend to receive an overall score (totalvurdering mikroskopi) in the range of 1-3. If your soil sample has received a score within this range, it is considered normal or average. A score greater than 3 means it has higher than usual biological activity (which is usually good), and lower than 1 is a very poor rating.

General assessment criteria

In healthy soil, the ecosystem is highly complex and all “trophic levels” are represented. In most of the soils that we see, only lower trophic levels are represented. We tend to see bacteria and fungi (producers and decomposers) in the first trophic level, and flagellates in the second. In a more complex soil ecosystem, we would also see a few ciliates, rotifers, and other organisms at higher trophic levels. The presence of higher level predators in an ecosystem suggests that the food chain is functioning properly, since there must be sufficient food and habitat to support them.

Frequently asked questions

What is the relationship between fungi and bacteria in soil?

The ratio of fungi to bacteria is indicative of the type of soil ecosystem, and seems to correspond somewhat with ecological succession. Ecosystems in an early successional stage (eg. areas with frequent stress and disturbance, such as farms) tend to support pioneering species with a short life cycle that colonize, grow, and reproduce quickly such as bacteria (and on a larger scale, weeds). Ecosystems in a later successional stage such as forests tend to support species that have a slower life cycle, take longer to colonize, and are more sensitive to disturbance.

Good agricultural soil tends to have a more equal balance of bacteria and fungi, rather than extreme dominance of one or the other. It is typical for degraded agricultural soil to have a high bacterial dominance.

Why do we look at overall diversity instead of looking for specific indicator organisms?

We are learning more and more about the importance of biodiversity and that this applies to soil as well the forests, oceans, and all other ecosystems. Each member of an ecosystem has a specific role, or niche, and performs specific functions that contribute to the health and resilience of the system as a whole. In soil, a more robust and complex soil food web means rich, diverse nutrient cycling and retention, better physical soil conditions such as structure, appropriate water drainage and retention, and better resilience in the face of challenges such as disease, pest outbreaks, and pollution.

What steps can I take to improve the ecological health of my soil?

We can reduce the impact of agriculture on the soil ecosystem by reducing the frequency and intensity of tillage, using cover crops and crop rotations, and by the addition of compost, compost tea, and other products that promote healthy microbial activity and support the soil as an ecosystem.