VERITERRA LAB

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Oct 9, 2023

Full Soil Biology Assessment

Report Performed By:
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Client:

Sample name: Sample A
Sample type: Soil
Plant desired: New Landscape
Plant Succession*: Mid-Successional-(flowers) - Grasses - Shrubs

Sample collected: 09/27/2023
Sample observed: 10/02/2023
Observed by: Vera Dorzhinova

Fungal-to-Bacterial biomass ratio (F:B):

0.05

Low for your plants! See explanation below

*For convenience the report is performed for Grasses Stage of Succession

Visual assessment: At the moment of the assessment the moisture of the sample was around 45% (squeeze test). Slight unpleasant (anaerobic) smell. Some visible aggregates, but a lot of clumped compacted soil. Lots of roots, some red and black rocks/fragments.The color is brown with some gray. Rich brown 70% cocoa color could indicate the presence of beneficial organic compounds such as fulvic and humic acids.

Microscope Assessment: See below biomass values and numbers for each organism group in comparison with recommended ranges for your plants stage of succession (landscape plants usually belong to 3 different successions - mid (like frlowers), grasses and shrubs, for convenience ranges for grasses were chosen for comparison).
“Sample results” value is the mean of biomass values/numbers of observed organisms per gram of your soil. Standard Deviation is variability of the mean.

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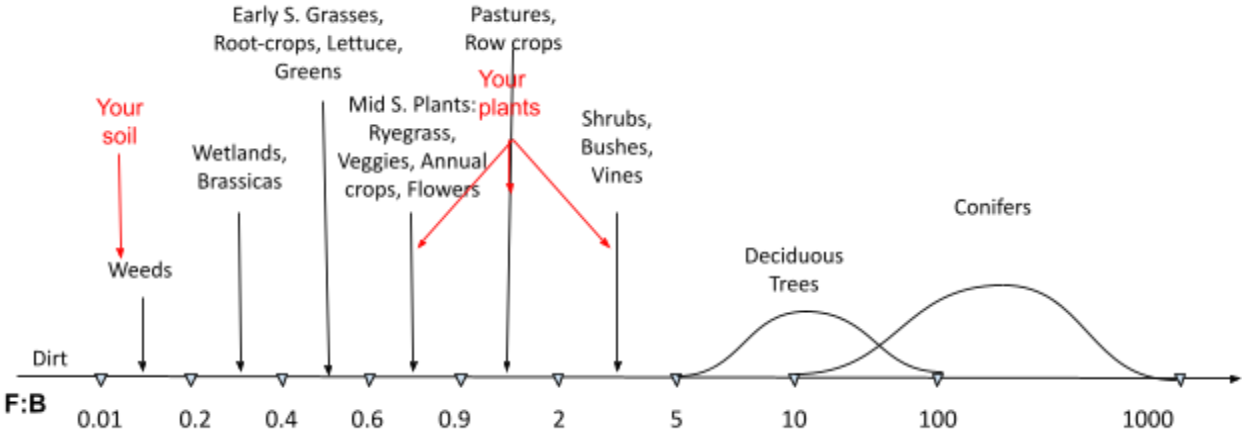
Group of microorganisms	Recommended range for Grass (per gram)	Sample results (per gram)	Standard Deviation (% of mean)	Notes
Bacteria	135 - 1350 µg	2,640 µg	696 (26%) Acceptable	The bacterial biomass is significantly greater than the maximum recommended level. Diversity: mostly cocci, some bacilli and coccobacilli. No signs of human pathogens.
Actinobacteria	1-4 µg	4.85 µg	2.39(49.3%) Low precision	Too high for plants that need mycorrhizal colonization. Please contact your Soil Biology Consultant.
Fungi	135 - 1350 µg	**131.6 µg**	172(130.5%) Low precision	Low: The fungal biomass is below the recommended minimum level for your plant's stage in succession. Please contact your Soil Biology Consultant.
Oomycetes	0 µg	**153.6 µg**	194.5(127%) Low precision	The oomycete biomass is greater than the fungal biomass, this is a problem that needs to be addressed - some oomycetes can cause diseases if conditions are right.
Protozoa				
Aerobic Protozoa (Total)	> 50,000	**0**	0	None detected. Some were detected in additional assessments. Protozoa help keep bacterial populations in balance and enhance nutrient cycling.
- Flagellates	(See Total)	0	0	None detected.
- Amoebae	(See Total)	0	0	None detected.
Ciliates	0	16,297	36,442(224%) Low precision	Results derived from 1 ciliate observed at 1:10 dilution. Unless this is a worm cast or lots of other protozoa present, ciliates indicate reduced oxygen conditions.
Nematodes				
Bacterial-feeding	300	**0.74**	N/A	Results derived from Nematode Extraction procedure. BFNs help keep bacterial populations in balance and enhance nutrient cycling.
Fungal-feeding	100	**0.08**	N/A	Results derived from Nematode Extraction procedure . FFNs help to release nutrients from fungal hyphae to the plants.
Predatory	100	0	N/A	None detected. Predatory nematodes help reduce root-feeding nematode numbers.
Root-feeding	0	**0.71**	N/A	Results derived from Nematode Extraction procedure. See comments
F:B Ratio	0.9:1 - 2:1	**0.05**	N/A	The F:B ratio is low for your plant. Increase fungi and bacteria predators

High precision: Distribution of the target organisms in the sample was uniform; variation was small.
Acceptable: Distribution of organisms was somewhat uneven, resulting in an acceptable degree of variation.
Low precision: Few target organisms were present and variability was very high. Precision is very low.
The Standard Deviation is a measure of how spread out numbers are. A low Standard Deviation indicates that the values tend to be close to the Mean or the Mean is precise. The larger the Standard deviation becomes, the less valid the data becomes. We take measures to reduce the standard deviation, but usually high Standard Deviation reflects low organisms numbers.

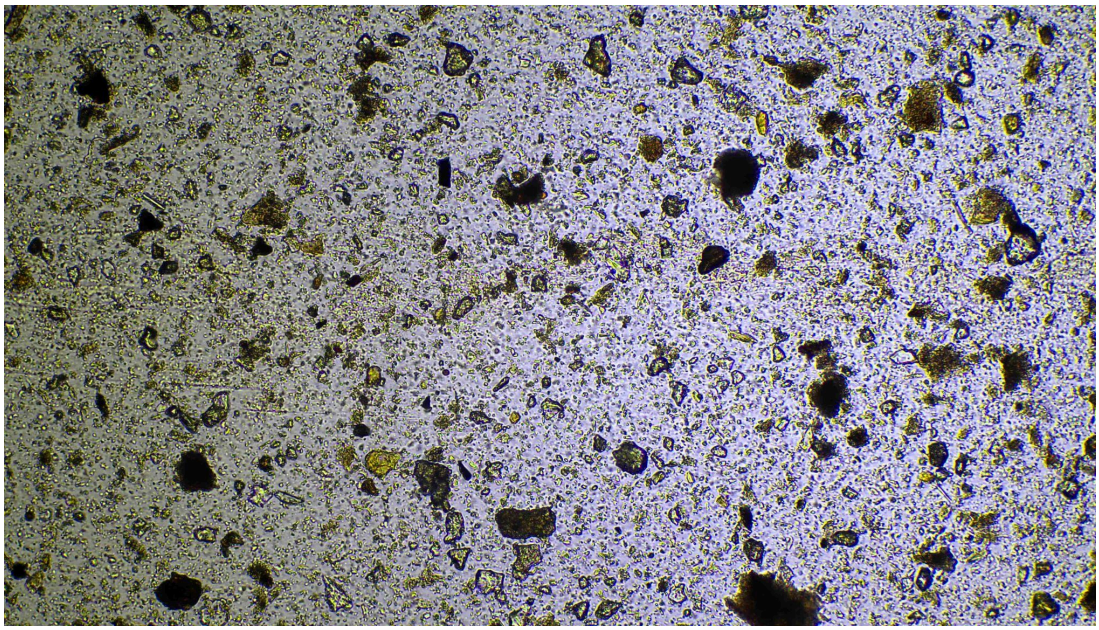
Additional comments: Mostly mineral particles, but organic matter present in decent quantities. Some aggregates, but overall low aggregation of particles. Aggregation should be improved so that there's more O_2, and nutrients and H_2O are held better (fungi!). **Abundant bacteria might not be a problem when balanced by fungi and bacterial predators**. **Statistically insignificant amounts of predators** (very little amount of protozoa, bacterial and fungal feeding nematodes) were observed in different assessments - **very little plant-available nutrients get released from bacteria and fungi** *(nutrients can be also released by arthropods, worms or provided through mycorrhizal fungi, nitrogen fixing bacteria or rhizophagy which are not assessed here).* Almost 1 root-feeding nematode per gram of soil can cause problems. Significant amounts of oomycetes, some actinobacteria, ciliates and root-feeding nematodes - **reduced oxygen conditions are present.** Fungal biomass looks promising, but high SD indicates that there weren't enough fungi to be spreaded evenly on a slide and therefore actual biomass is most likely lower. **Low F:B ratio promotes weeds** because in bacterial dominated soils NH4 gets converted to NO3 (conducive for weeds). To increase F:B ratio, fungal biomass and predators should be increased further by using bio-complete compost/extract/tea, protozoa infusion or other available methods.

Fungal to Bacterial biomass ratio: Soil Food Web succession in your soil doesn't match your plant's succession:

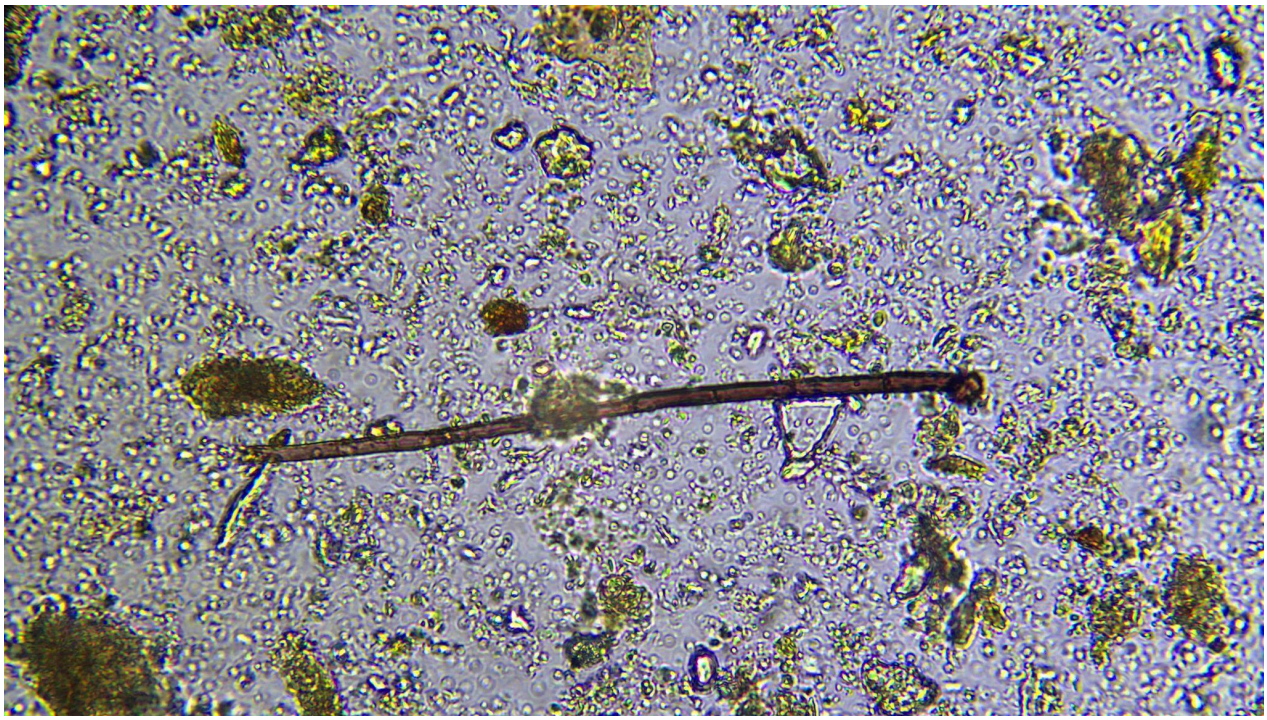


See some microscope pictures below.

Low Aggregation, 1:10 dilution, 100X Mag

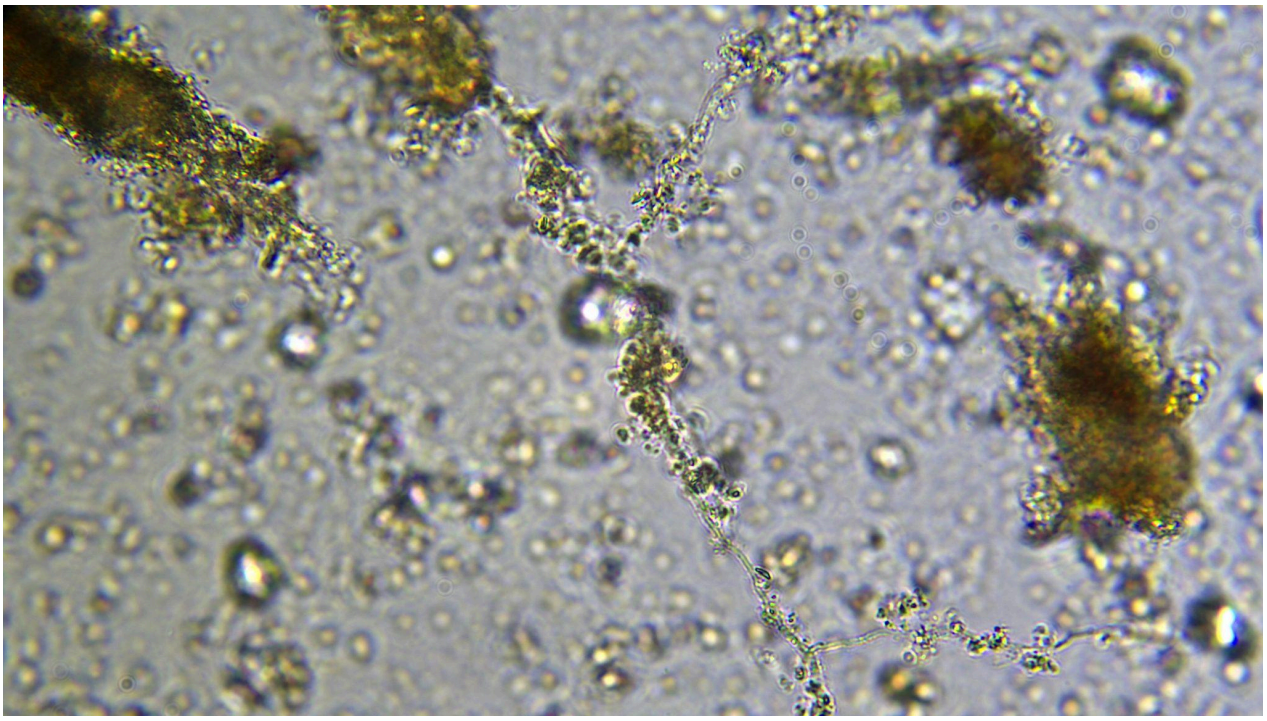


Example of beneficial fungus. 400X Mag



1:10 dilution

Example of oomycetes. 400X Mag



1:30 dilution

Example of a bacterial-feeding nematode. 100X Mag

Nematode Extraction

Example of a root-feeding nematode. 100X Mag

Nematode Extraction