

A photograph of a forest floor. In the foreground, a log is covered in vibrant green moss. A small, delicate orange mushroom with a thin stem and a conical cap is growing from the moss. The background is a soft-focus forest with tall, slender tree trunks and dappled sunlight filtering through the canopy.

Why Measure?
To Meet, and To Know.

*Measuring soil biology to support our
expressions and rhythms of care.*

September 2023

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Outline

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Tools

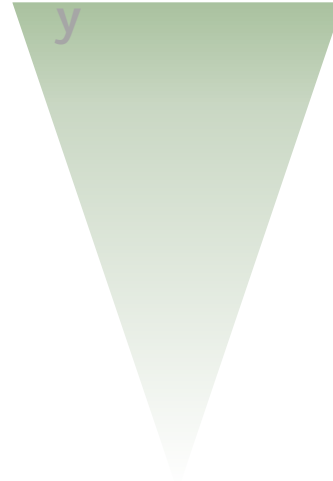
Management

Care

Desire

Why Measure?
To Meet, and To Know.

*Using science to support our
expressions and rhythms of care.*



Ritz et al. 2009. Selecting biological indicators for monitoring soils: A framework for balancing scientific and technical opinion to assist policy development. *Ecolog Indicators*. 9:1212-1221.

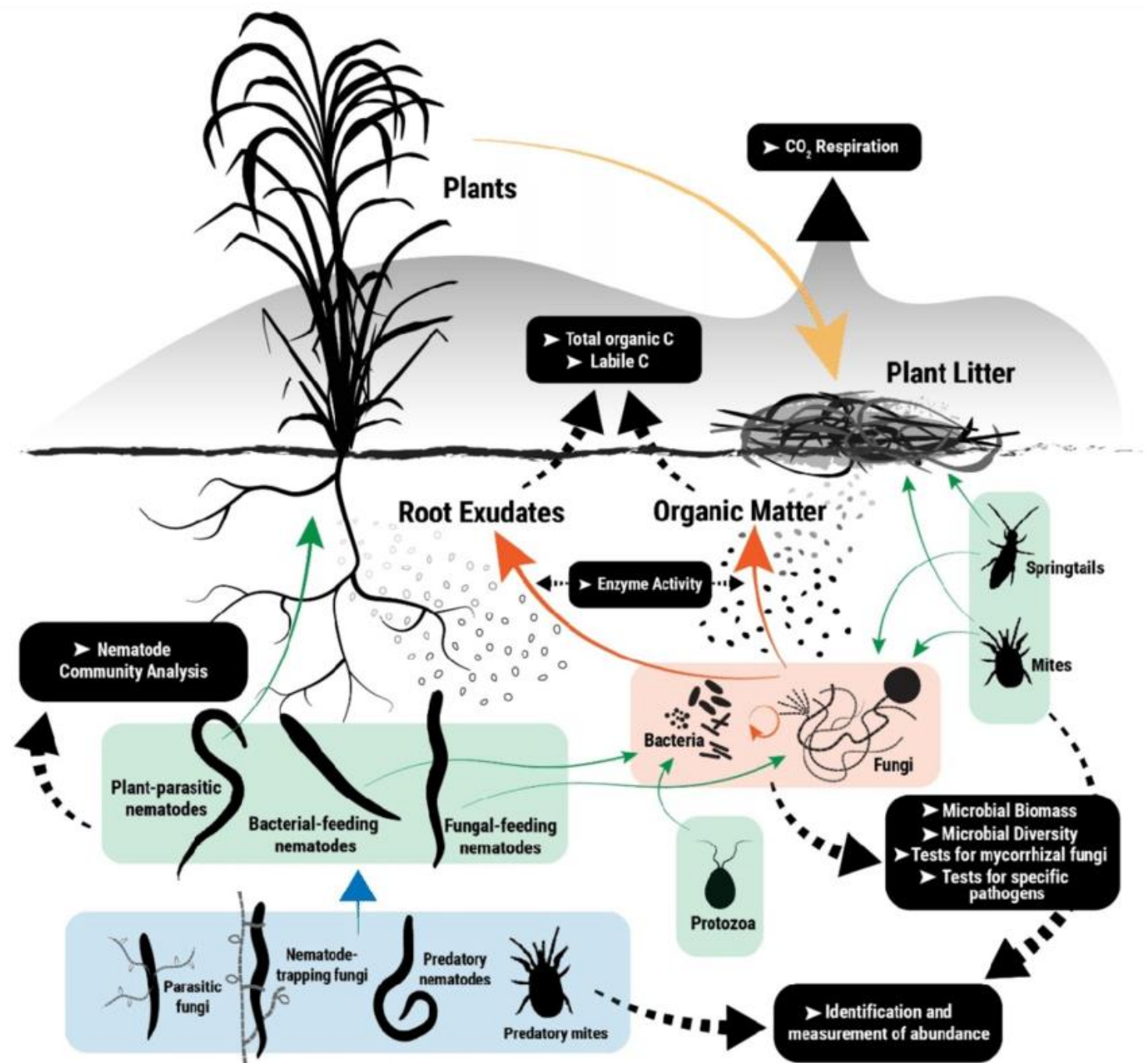


Table 1

Prescribed soil functions used to assess biological indicators, ecological processes and properties related to such functions^a and examples of related soil biota.

Soil functions	Ecological processes and properties	Examples of related soil biota
Food and fibre production	C cycling Decomposition of organic matter N cycling P cycling S cycling N fixation Primary (microbial) activity Soil food web transfers Disease and pest transmission/suppression Nutrient supply from symbioses Redistribution by bioturbation Bio-aggregation of soil	Microbial biomass, methanogens Microarthropods, saprotrophic fungi Nitrifiers, denitrifiers Phosphatase, mycorrhiza Sulphur-reducing bacteria Rhizobia Microbial community structure and activity Microbial community and food web structure Predators, pathogens Mycorrhiza, N-fixers Earthworms, ants Fungi, worms
Environmental interactions	Degradation/immobilisation of pollutants C retention/release N retention/release P retention/release Tolerance/resistance (toxins) S retention/release Redistribution by bioturbation Bio-aggregation of soil	Fungi, worms Microbial biomass, methanogens Nitrifiers, denitrifiers Microbial activity, mycorrhiza Soil community structure and activity Sulphur-reducing bacteria Earthworms, ants Fungi, worms
Supporting habitats and biodiversity	Habitat for rare soil species Germination zone for plants Nutrient supply from symbioses Food source (aboveground) Reservoir for soil biodiversity (taxonomic) Reservoir for soil biodiversity (genetic) Reservoir for soil biodiversity (functional)	Wax cap fungi, Southern Wood ant Plant roots, mycorrhiza Mycorrhiza Fungi, insects Soil species and diversity Community DNA and RNA Nitrifiers, trophic structure, worms

^a These functions correspond to UK soil policy documents and predate the recent communication on the European Commission Soil Framework Directive (2006). They can be considered amalgam of the individual functions now being relayed in this communication.

Steinitz, 1993

MacEwan, 1998

Ritz, 2008

Soil Management Assessment Framework (SMAF)

Haney Soil Health Test (HSHT)

Cornell University's comprehensive soil health assessment (CASH)

Soil Health Institute (SHI) (Tier 1 and Tier 2)

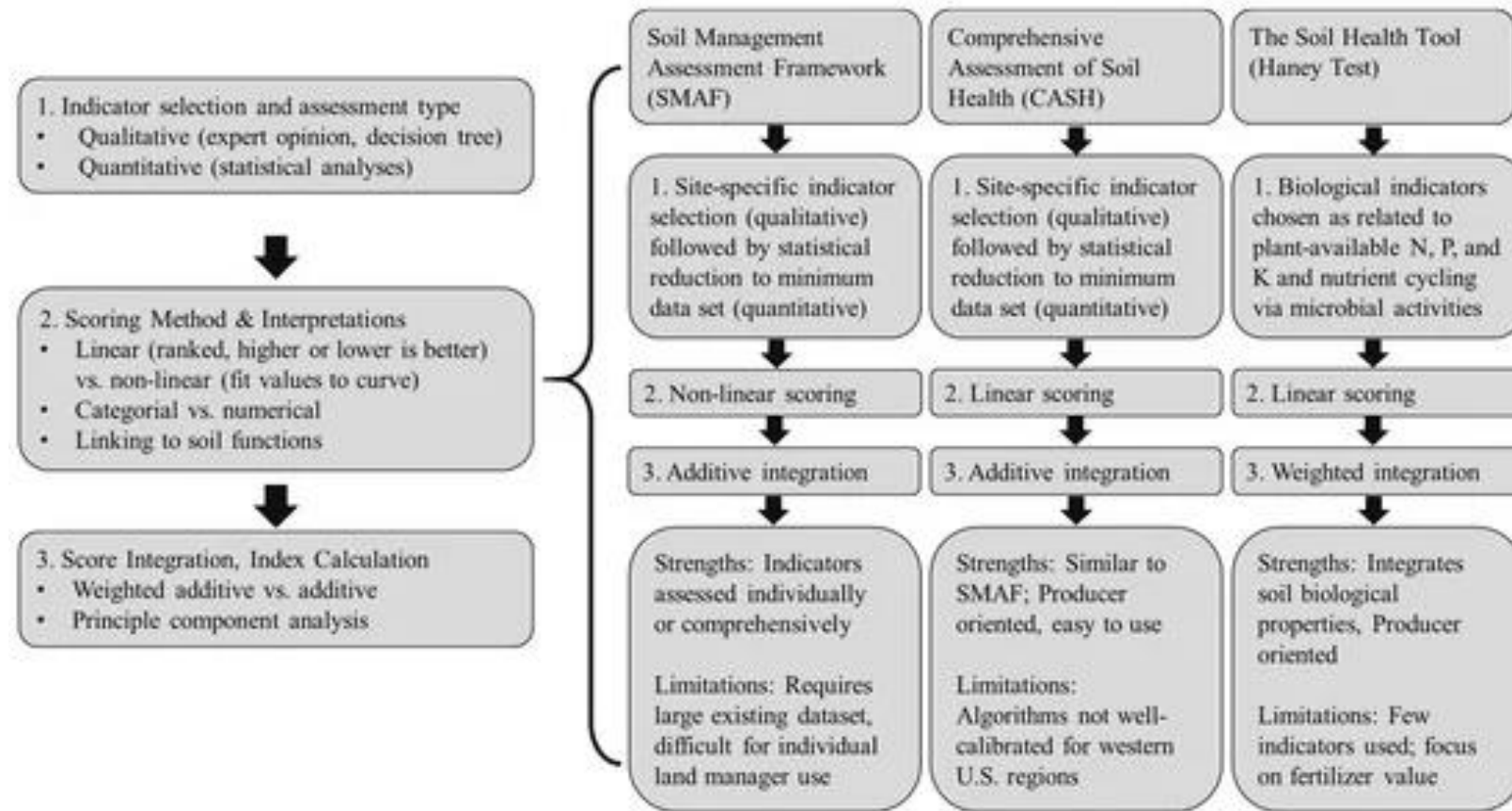
Soil Health Assessment Protocol and Evaluation (SHAPE)

How do we measure soil health?

Frameworks

How do we measure soil health?

Frameworks



How do we measure soil health, locally?

Local Tools: Nemlab, Sporatec, LabServe

2023 PRICE LIST

NEMATODE ANALYSES

Apples, pears & persimmons, tuberous crops (soil & roots)	R790
Citrus	R650
Vines, stone fruit, nuts, row crops, etc.	R520
Cyst nematodes (brassicac, potatoes, figs, hops)	R520
Xiphinema index (grapevine only)	R520

NEMATODE COMMUNITY PROFILE ANALYSES

Nematode Community Profile only	R650
Nematode Community Profile & routine soil analysis	R870
Nematode Community Profile & routine soil and root analysis	R1 150

GRAPEVINE BUD ANALYSES

Bud Fruitfulness (10 shoots, 16 buds per shoot) per bud	R8.50
Bud Mite analysis (12 shoots, 6 buds per shoot) per ha/block	R510

OTHER ANALYSES

Plant disease analysis	R750
<i>Phytophthora</i>	R820
Combo (Plant disease & <i>Phytophthora</i>)	R1 350
Mycorrhizae colonisation test	R520
Phylloxera analysis	R330
Insects	Price on request
Mites	Price on request
Pollen viability test	R330
Insect trap counts	R80

PRODUCT TESTING

Nematode bio-assays	Price on request
Biostimulant testing	Price on request
Trials	Price on request

Courier costs/handling fee	R70
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How do we measure soil health, locally?

Local Tools: **Nemlab**, Sporatec, LabServe

Microbial community analysis

Enzymatic analysis

N-fixing bacterial analysis

How do we measure soil health, locally?

Local Tools: Nemlab, **Sporatec**, LabServe

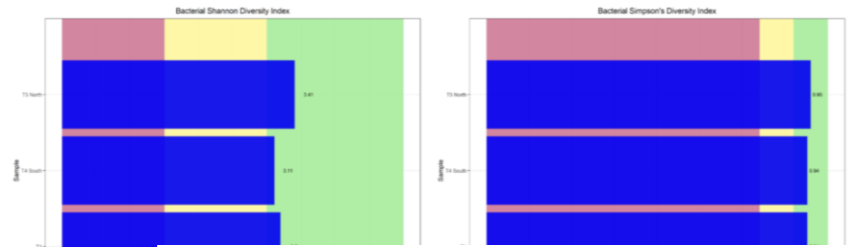
Microbial Community Analyses	Soil Enzymatic Tests	Quantification of N-fixing Bacteria
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We make use of a molecular fingerprinting technique, to generate a profile for each composite soil sample. Analysis of the sample allows us to examine (single sample time point) the diversity and monitor (numerous sample time points) changes in the microbial community. This information is essential in determining how well the biological soil management strategies are performing.

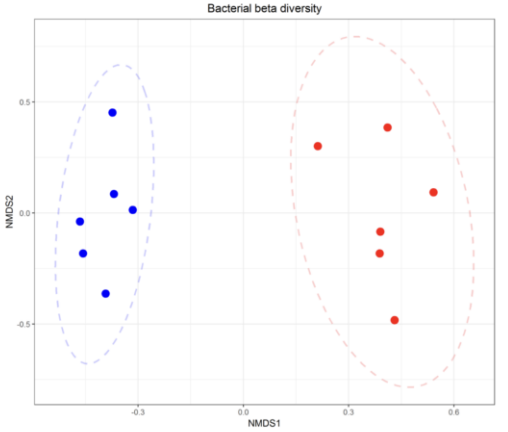
Price: R600.00 excl. VAT

We do offer a package deal for the Microbial community AND Soil enzymatic activity analyses for R1000.00 excl. VAT.

The graphs below indicates the diversity and evenness of the microbial community. To answers questions like: do you have enough different microbes, and are there microbes that dominate the microbial community?



This method is ideal to compare the effect of different treatments on the microbial community in the soil.

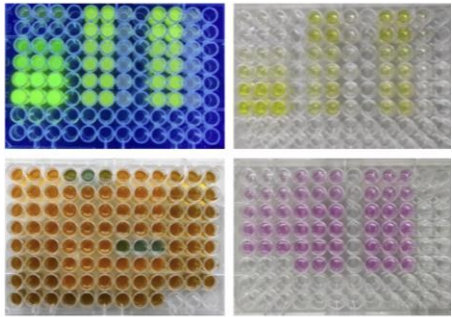


Soil Services:		
Microbial Community Analyses	Soil Enzymatic Tests	Quantification of N-fixing Bacteria

Soil nutrient status and the rate of production of soil chemical components are important indicators of soil health. Nitrogen and phosphorus are often in short supply in the soil, and tests that can indicate how much of these nutrients are available, or whether there is sufficient potential to supply these nutrients, can shed light on the status and trajectory of soil health over time. These tests are also an indication if the microbes are actively producing enzymes to increase the nutrient availability to the plant.

We test for:

- EC
- Soil Moisture
- pH (water)
- Nitrate and Ammonium
- N-mineralization
- Urease
- β -glucosidase
- Available P
- Alkaline- and Acid phosphatase
- Microbial Activity
- Organic Carbon
- Active Carbon



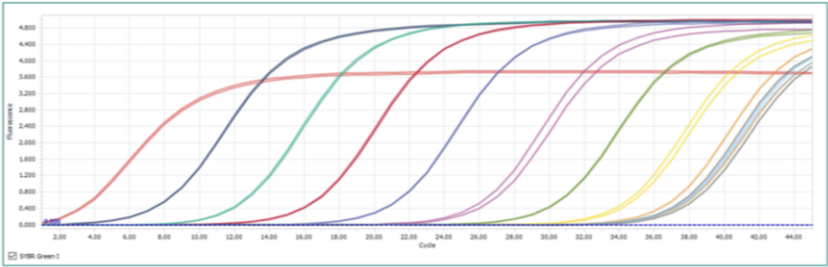
Price: 600.00 excl. VAT

We offer a package deal for the Microbial community AND Soil enzymatic activity analyses for R1000.00 excl. VAT.

Soil Services:		
Microbial Community Analyses	Soil Enzymatic Tests	Quantification of N-fixing Bacteria

Using quantitative polymerase chain reaction (qPCR), we are able to quantify certain functional groups. Healthy soils have various functions that are performed by microorganisms. This technique allows us to monitor the relative levels of the organisms in the soil.

Price: R225.00 excl. VAT per sample





HOME

ABOUT US

SERVICES

PRICE LIST

SANAS ACCREDITATION

ARTICLES & DOWNLOADS

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SERVICES

Labserve, along with its business partners, offers extensive testing, locally and internationally to provide you with results on the following analyses:



Soil



Leaf



Fruit



Drinking Water



Irrigation Water



Waste Water



Global Gap Water



Growing Medium & Compost



Microbiology



Pesticide Residue (MRL's)



Fungicide Testing
(Phosphonates,
Dithiocarbamates)



Plant Growth Regulator
Testing (Ethephon)



Herbicide Testing
(Glyphosate)

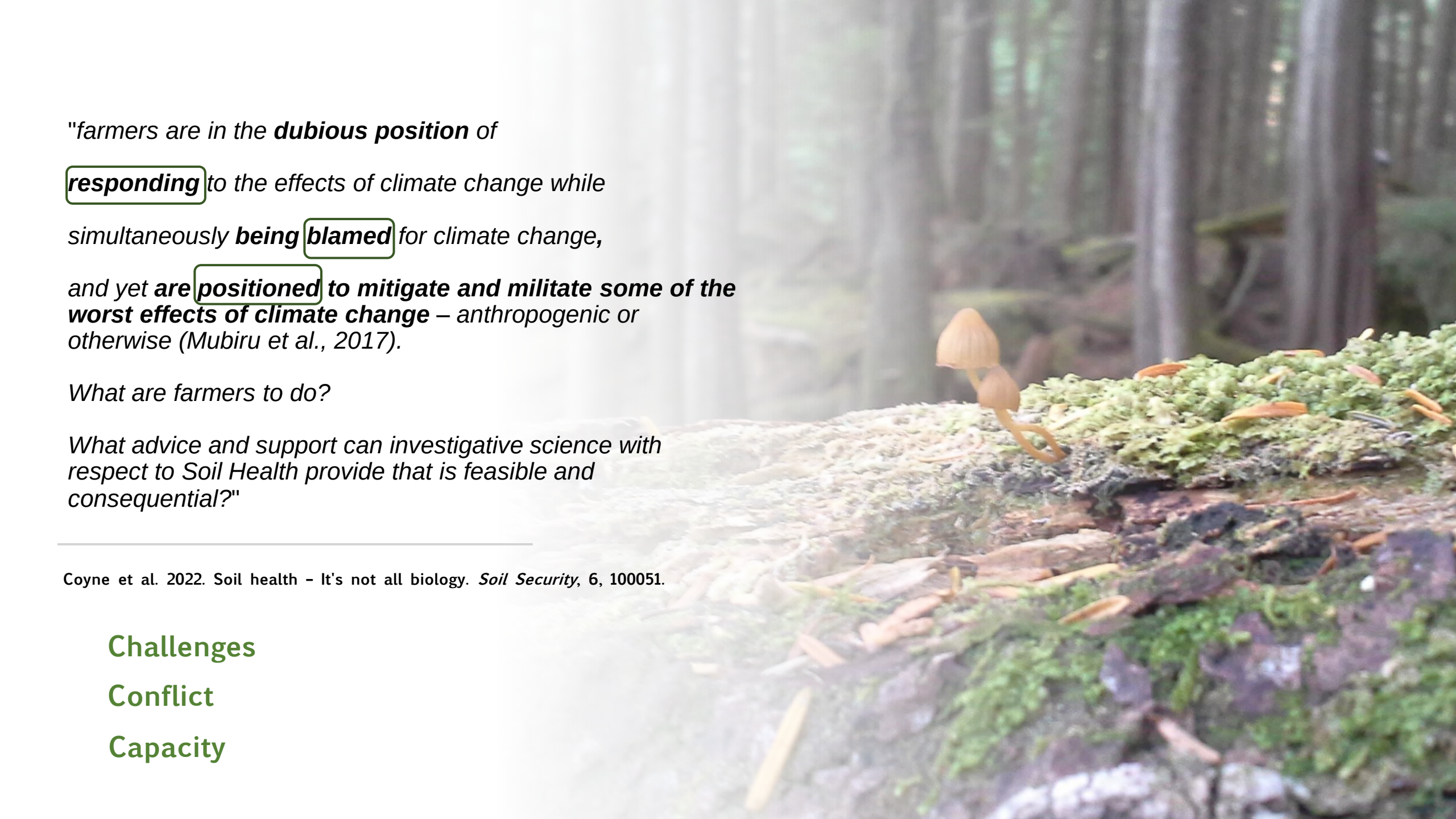


Hand & Surface
Swabs(QC)

PRICE LIST & PARAMETERS

How do we measure soil health, locally

Local Tools: Nemlab, Sporatec, Labserve



"farmers are in the **dubious position** of **responding** to the effects of climate change while simultaneously **being blamed** for climate change, and yet are **positioned** to **mitigate and militate** some of the **worst effects of climate change** – anthropogenic or otherwise (Mubiru et al., 2017).

What are farmers to do?

What advice and support can investigative science with respect to Soil Health provide that is feasible and consequential?"

Coyne et al. 2022. Soil health – It's not all biology. *Soil Security*, 6, 100051.

Challenges

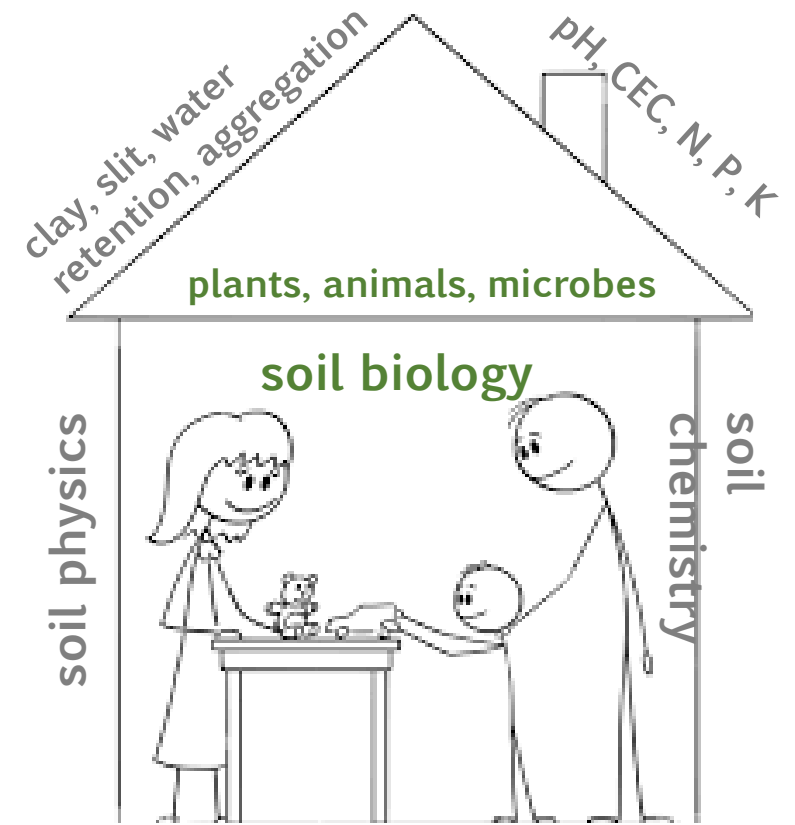
Conflict

Capacity

"Soil is a "field of dreams" - if you build it, they (the biology: plants, microbes) will come. It is inevitable. The biology does not need training to occupy the ecological niches it inhabits. As with any real estate - location, location, location.

Good infrastructure (aggregation) and good services (aeration, hydration, nutrition, etc.) make for a good neighbourhood.

While we debate the necessity of Soil Health to preserve the many soil functions that enable us to live, we must not forget that no amount of biology and particularly microbiology can restore an environment that no longer exists."



Baas-Becking (1934). everything is everywhere. the environment selects.



Why Measure? To Meet, and To Know.

*Using soil biology to support our
expressions and rhythms of care.*



Can we even use the term Soil Health? Only an organism can be healthy.

‘[health is] true of complex systems exhibiting *emergent* properties such as resilience in the face of perturbation’. Harris et al. 2022. A new theory for soil health. EJSS. 73:4.

Caring for an organism: caring for a child or caring for an aged parent.

Story time: personalised medicine.

Outline

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Personalised medicine and cancer.

Prof Anna-Mart Engelbrecht and the Tumour Board.

Personalised Health Strategy

EXPERTS AND RHYTHMS

Yearly (?) check ups

Relational Engagement with experts (desire: wine or coffee)

PARAMETERS

Know your own child and his/her health

Why Measure?
To Meet, and To Know.

Observation – learning from the environment

Using soil biology to support our expressions and rhythms of care.

Celebrate

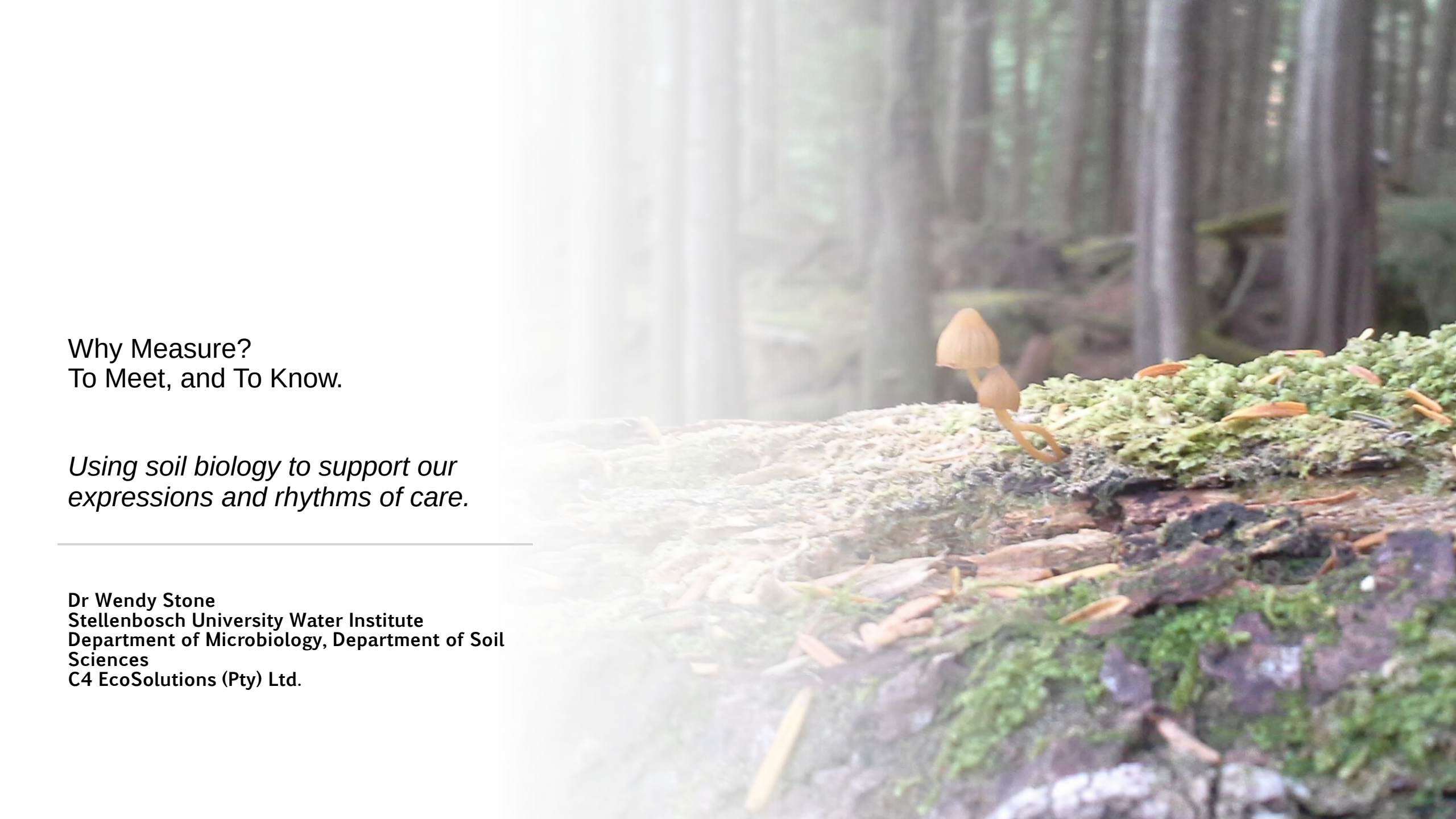
Play – Regenerative farming

So, practically, how do we care for a child, or aged parent?

Someone under our responsibility?

And how do we use these parameters?

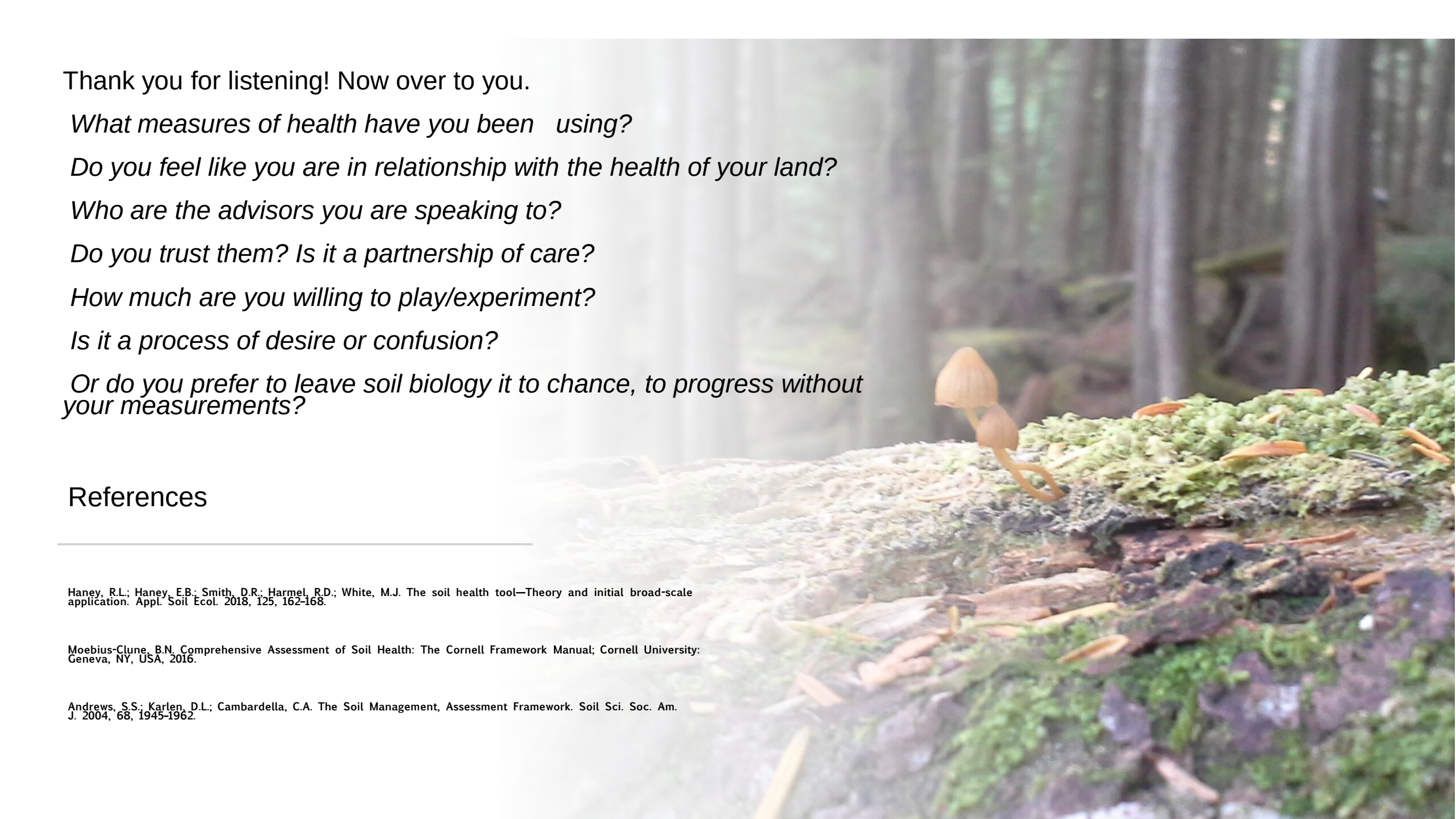


A photograph of a forest floor. In the foreground, a log is covered in vibrant green moss. A small, light-brown mushroom with a conical cap and a thin stem is growing from the moss. The background is a soft-focus forest with many thin tree trunks and some green foliage.

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Thank you for listening! Now over to you.

What measures of health have you been using?

Do you feel like you are in relationship with the health of your land?

Who are the advisors you are speaking to?

Do you trust them? Is it a partnership of care?

How much are you willing to play/experiment?

Is it a process of desire or confusion?

Or do you prefer to leave soil biology it to chance, to progress without your measurements?

References

Haney, R.L.; Haney, E.B.; Smith, D.R.; Harmel, R.D.; White, M.J. The soil health tool—Theory and initial broad-scale application. *Appl. Soil Ecol.* 2018, 125, 162–168.

Moebius-Clune, B.N. Comprehensive Assessment of Soil Health: The Cornell Framework Manual; Cornell University: Geneva, NY, USA, 2016.

Andrews, S.S.; Karlen, D.L.; Cambardella, C.A. The Soil Management, Assessment Framework. *Soil Sci. Soc. Am. J.* 2004, 68, 1945–1962.