Soil Health and What to Measure

Resilience, productivity and life

Growing Resilient Efficient And Thriving GREATsoils

GREAT soils
Resilience, productivity and life

AHDB Horticulture Project CP 107b aims to:

* Inspire growers to develop their ability to assess the health of their soil.
* Give growers practical solutions to improve soil health.

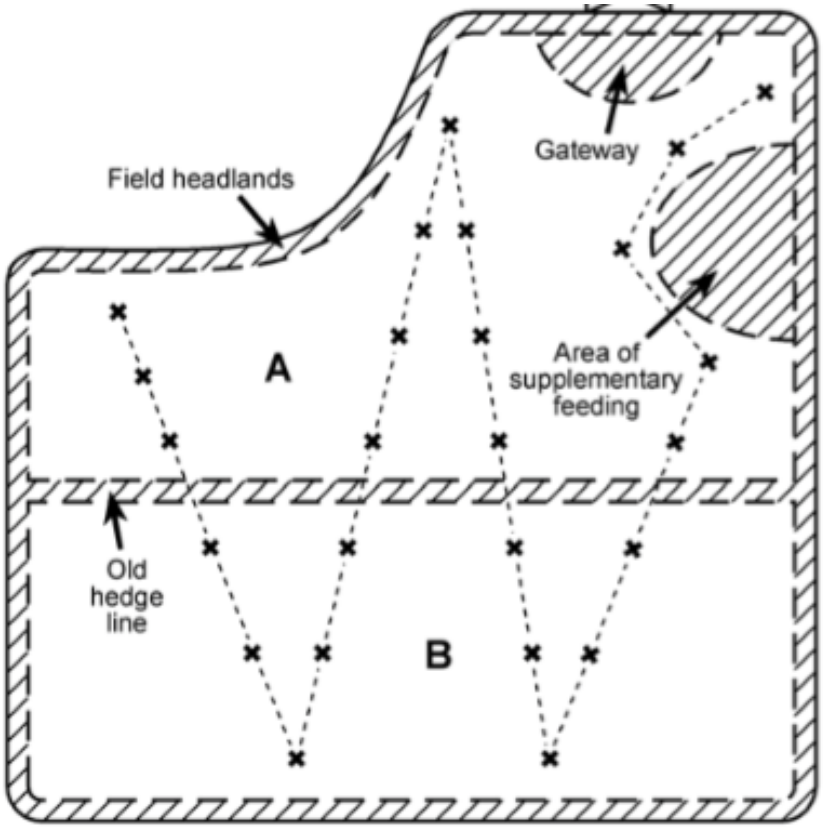
Funded by AHDB Horticulture. Delivered in partnership by Earthcare Technical, Organic Research Centre and Soil Association.

Soil Health - What to Measure?

- Introduction - sampling and rationale
- What to measure in the field
- What to measure in the lab
- Grower evaluation of methods

Sampling soil is key

- Avoid unrepresentative areas
- Avoid lime, fertiliser, manure
- 25 subsamples in “W”
- 10 ha maximum
- 20 cm deep for arable/veg
- Subsamples mixed to give ~0.5 kg sample for testing.



Soil testing - the rationale

1. Identify an area of land to be managed
2. Obtain a representative sample of soil
3. Obtain some information about the soil in that area of land (field/lab tests)
4. Use that knowledge to inform management practices e.g lime application, green manure
5. Repeat soil assessments/tests and review management practices.

Soil Assessment in the Field

* Spade test and examination

* Formal visual assessment

* In-field measurements e.g. infiltration

Signs of Healthy Soil in the Field

- Aggregates of particles 1-10 mm dia which remain stable when wet.
- Earthworm population (standardised method should be used e.g http://bit.ly/2byJR37)
- Assess earthworms in spring or autumn to avoid cold or dry soil.

Lincolnshire Fens

Soil capping
(poor infiltration of water and agrochemicals)

Soil compaction
(poor root growth, water-logging and lack of oxygen)

Visual Soil Assessment

- Soil structure
- Soil porosity
- Soil colour
- Soil mottles
- Earthworm count
- Tillage pan

Score + Weighting = Ranking

Testing in the field

Infiltration of water

- Simple infiltrometer
- Effect of compaction

In coriander bed

In wheeling

British Herbs Field Day
August 2016

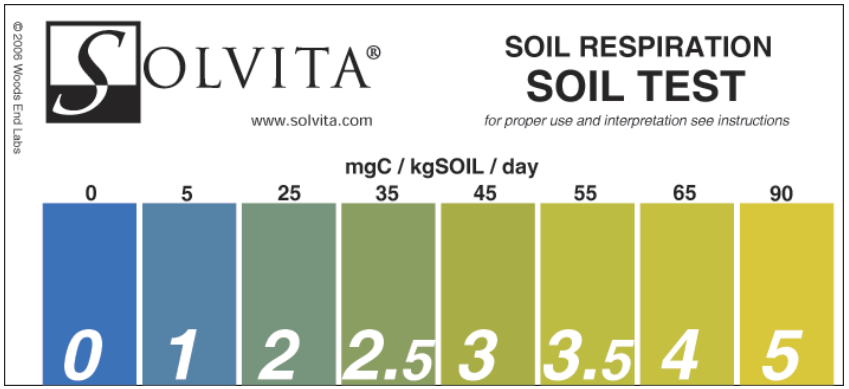
Soil Testing in the Lab

- Soil pH
- Soil phosphate
- Exchangeable cations
- Micro-nutrients
- Soil organic matter
- Soil respiration
- Soil Health Index

Soil Respiration Measurement

An indicator of biological activity in soil

- Measure CO_2 release from soil
- Solvita test (first generation)
- Standard volume of soil
- Visual colour chart system



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Earthcare TECHNICAL

Soil Respiration Measurement

An estimate of soil microbial biomass

- Drying and re-wetting of soil
- Measure burst of CO_2 that follows
- Digital colour reader for accuracy
- Estimate of soil microbial biomass
- Correlated with N, P mineralisation

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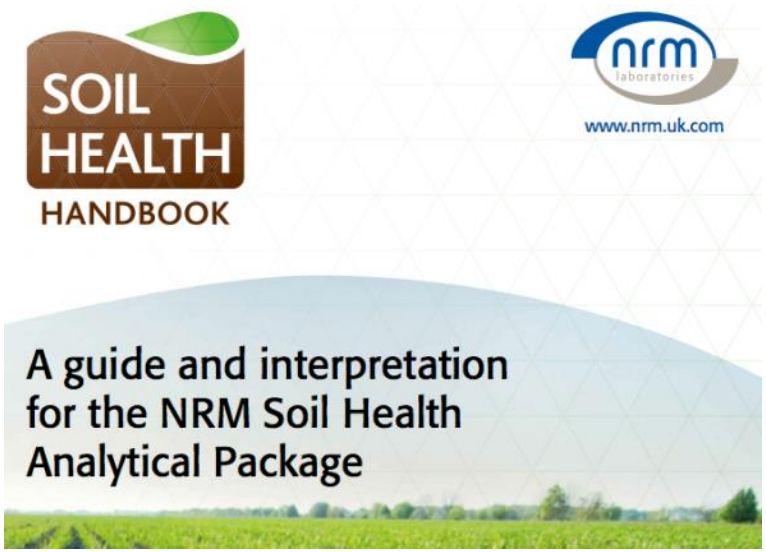
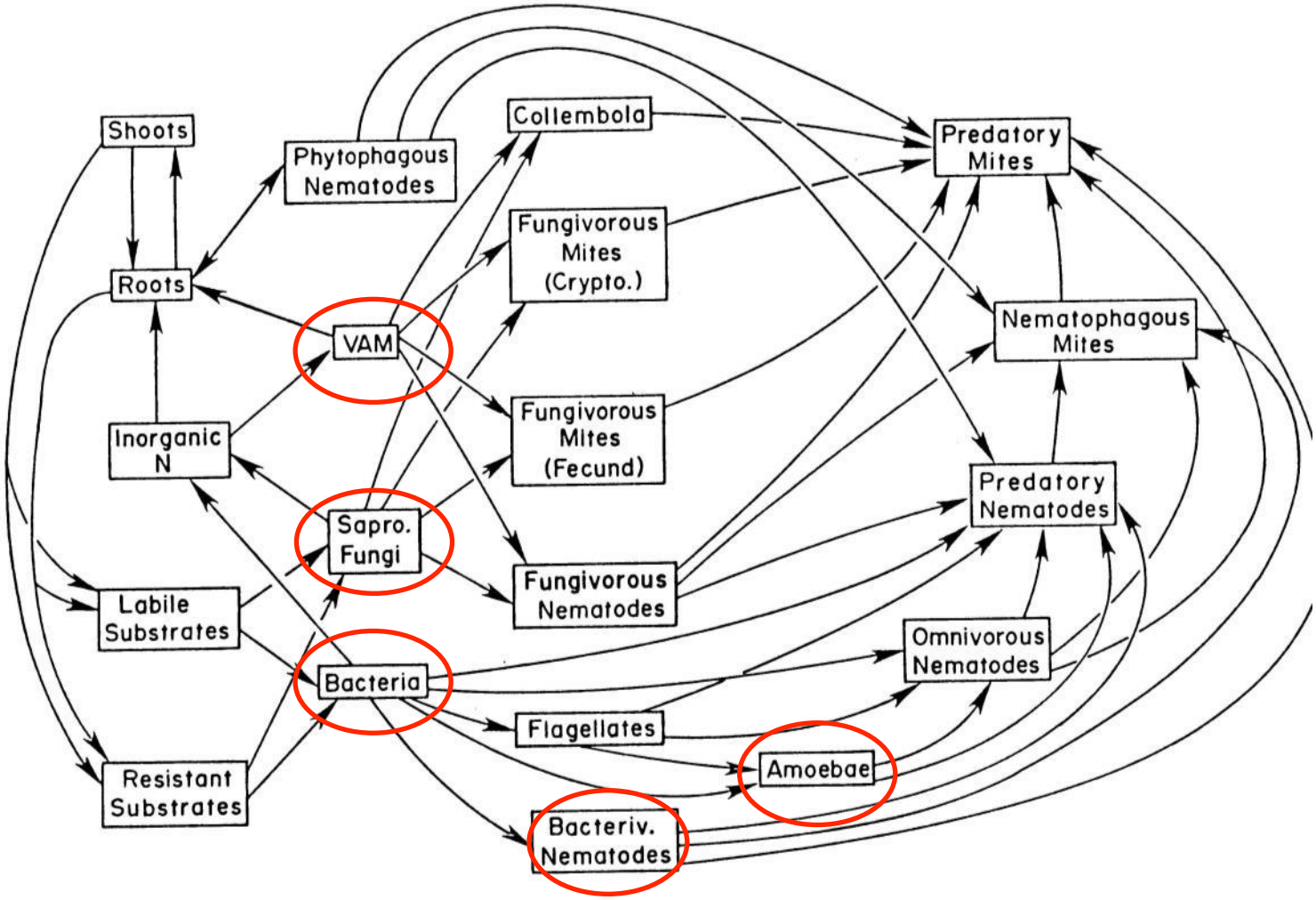
Soil Health Index

based on lab and field data:

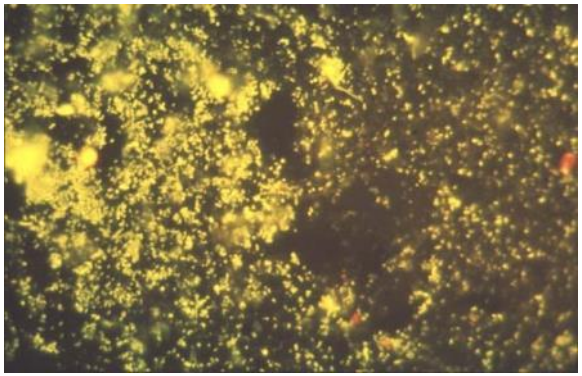
- pH, P, K, Mg
- texture, organic matter
- CO_2 burst test
- earthworm numbers
- compaction
- crop symptoms
- to give an overall index.



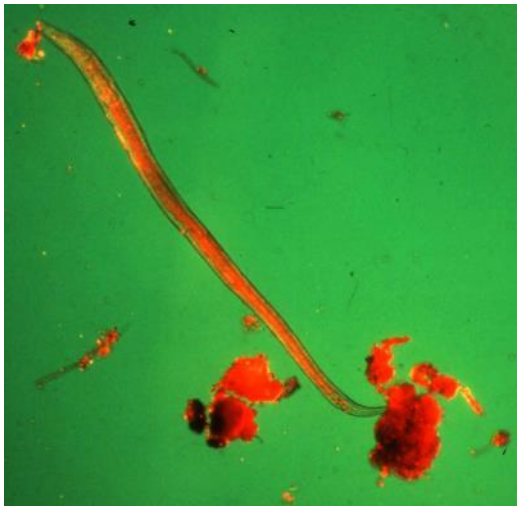
A Soil Food Web



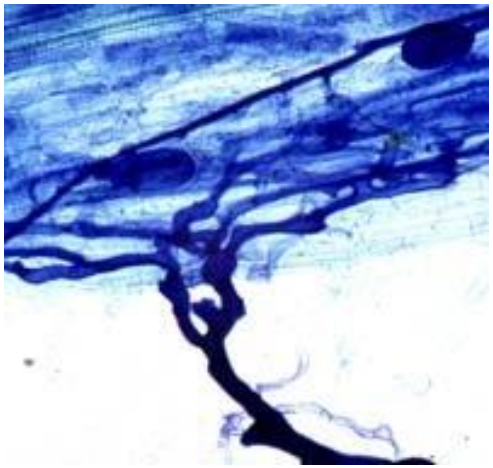
Soil under the Microscope



Total bacteria



Free-living nematodes
(non-pathogenic)



Mycorrhizal fungi
(Vesicular arbuscular)

Beyond Soil Organic Matter
- the light fraction

- Different fractions based on size and density of the individual particles
- Particles of low density <1.7 g cm^{-3} = the light fraction
- Includes physical remains of plants and animals, root fragments and fungal hyphae
- Subject to relatively rapid decomposition.

Grower evaluation of soil assessment methods

- Plots on grower sites
- 6 sites in England and Scotland
- Field veg and protected veg
- Field salads and protected salads
- Top fruit
- Conventional and organic

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Grower evaluation of soil assessment methods

- Earthworm counts
- Soil respiration
- Soil food web
- SOM Light fraction
- Ongoing 2016-17

Valefresco - Protected Salads

- Rocket and spinach
- Sandy loam soil
- Trialled green manures
- Buckwheat, Phacelia 6 weeks
- Soil Respiration
- Soil Health Index

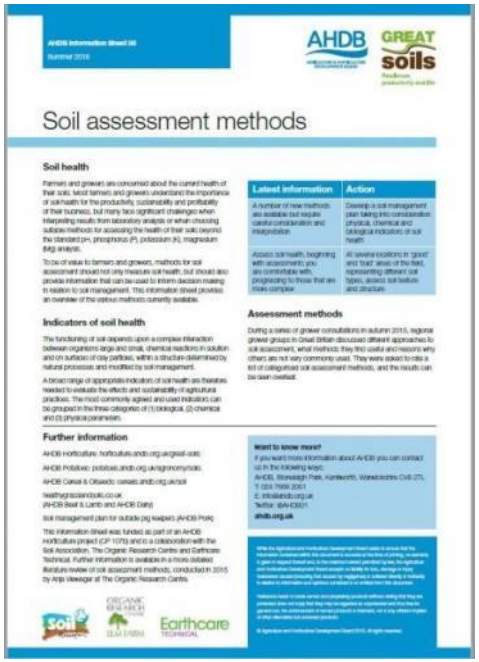
Soil Health Index

sandy loam, salads

pH	P Index (mg/L)	K Index (mg/L)	Mg Index (mg/L)
6.5	4 (48)	2- (134	3 (104)

Organic matter (%)	CO_2 burst (mg C/kg)	Texture	Soil Health Index
2.5	35	sandy loam	3 (out of 5)

Further information



AHDB Information Sheet 05 Soil Assessment Methods
http://bit.ly/2aqJx5b

AHDB Information Sheet 06 Case Study 1

In partnership with:

Growing Resilient Efficient And Thriving GREATsoils

- Webinars
- Publications
- Workshops

WEBINAR: Managing soil health using organic manures
Date: 7 October 2016
Time: 13:30 PM - 14:30 PM

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Get in touch

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