



WHAT IS A HEALTHY SOIL?

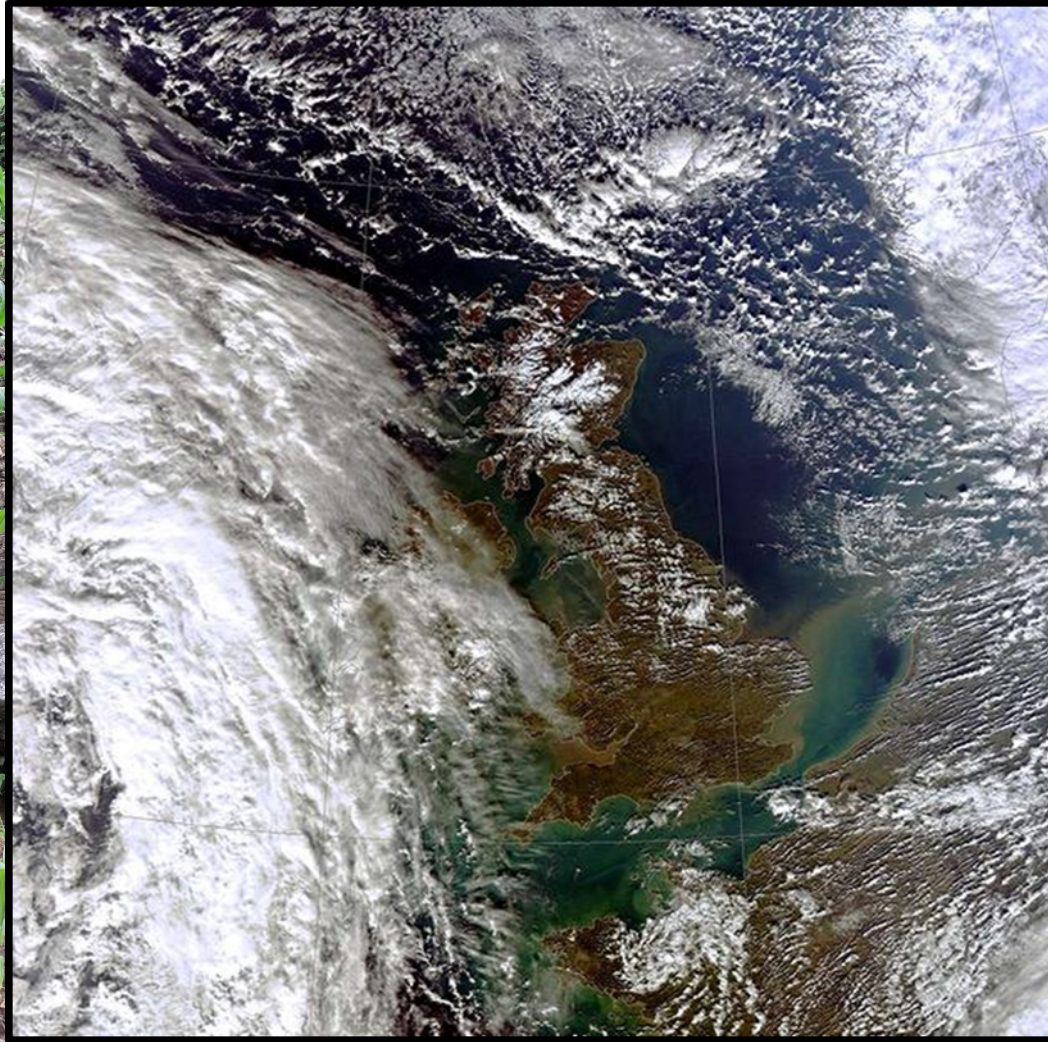
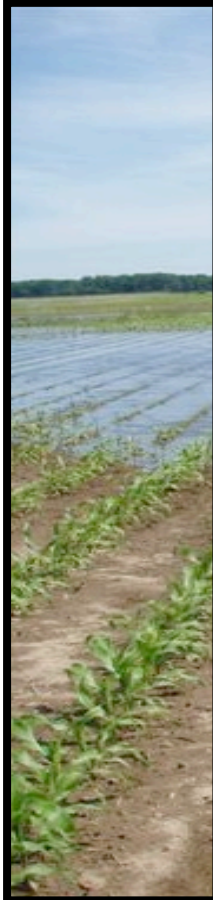
Professor Jenni Dungait

Oxford Farming Conference 2020

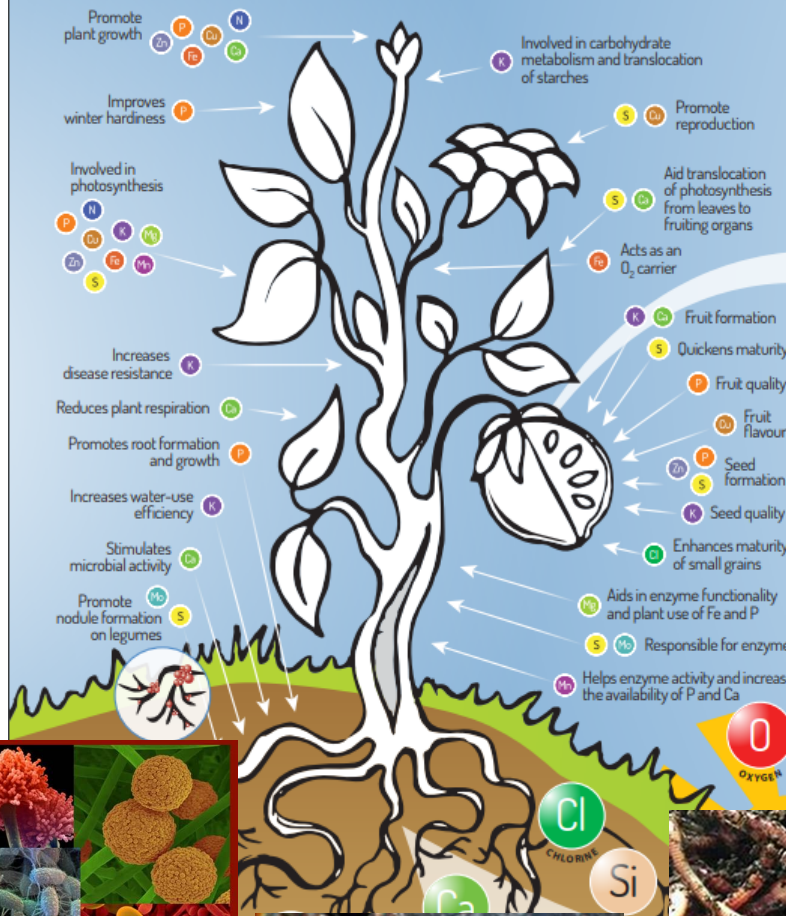
Break out session: How do we define a healthy farm?

Wednesday 8th January

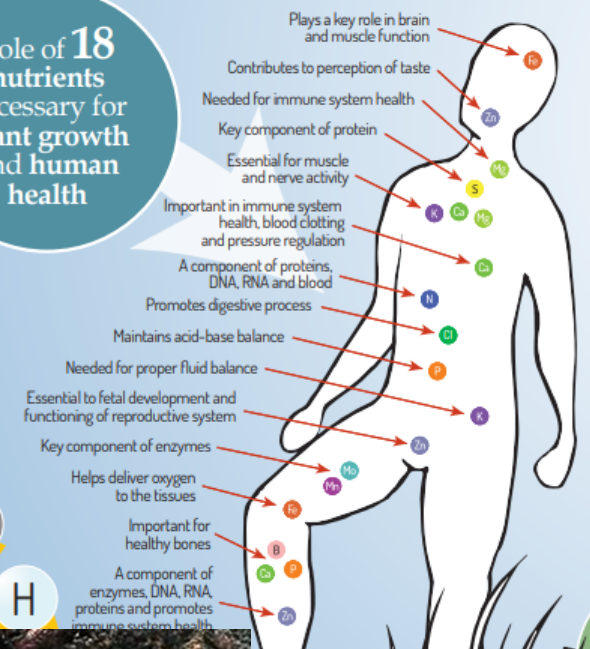
Unhealthy farm soil



Soil the foundation of nutrition



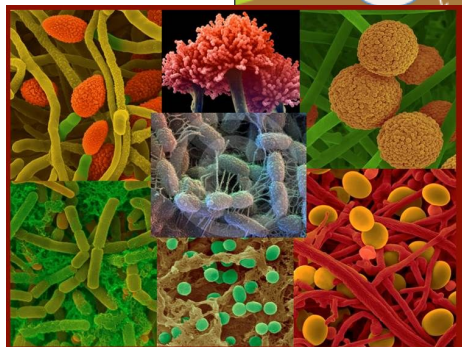
Role of 18 nutrients necessary for plant growth and human health



Soil degradation leads to the loss of soil micro and macronutrients

Nutrient-poor soils are unable to produce healthy food with all the necessary nutrients for a healthy person

Over 2 billion people suffer from micronutrient deficiencies



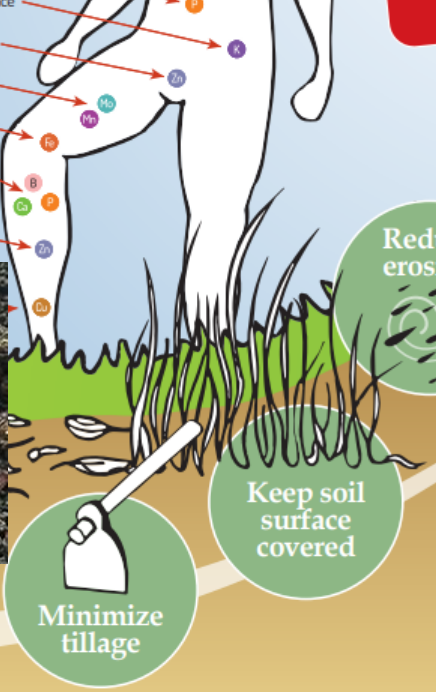
Soil macronutrients



Soil micronutrients








Soil organic matter content



Sustainable soil management for healthy soils, healthy food and healthy people

Healthy soil functions delivers public goods

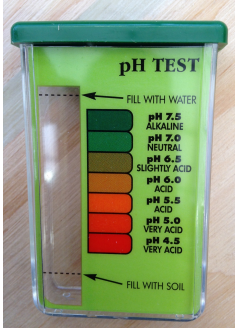
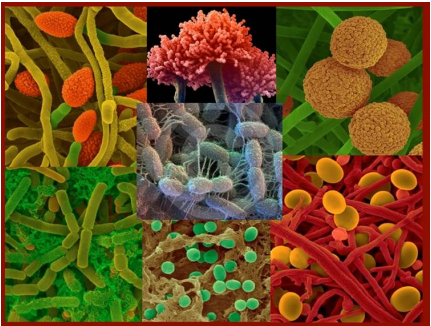
Environmental Land Management scheme 'payment for public goods'

-  Clean air
-  Reductions in environmental hazards and pollution
-  Thriving plants and wildlife
-  Clean water
-  Mitigation and adaptation measures to minimise the impact of climate change
-  Enhanced landscapes



What does healthy soil life need?

Habitat for soil organisms



What does a healthy soil look like?

https://www.sruc.ac.uk/info/120625/visual_evaluation_of_soil_structure



Structure quality	Size and appearance of aggregates	Visible porosity and Roots	Appearance after break-up: various soils	Appearance after break-up: same soil different tillage	Distinguishing feature	Appearance and description of natural or reduced fragment of ~ 1.5 cm diameter
Sq1 Friable Aggregates readily crumble with fingers	Mostly < 6 mm after crumbling	Highly porous Roots throughout the soil			 Fine aggregates	 The action of breaking the block is enough to reveal them. Large aggregates are composed of smaller ones, held by roots.
Sq2 Intact Aggregates easy to break with one hand	A mixture of porous, rounded aggregates from 2mm - 7 cm. No clods present	Most aggregates are porous Roots throughout the soil			 High aggregate porosity	 Aggregates when obtained are rounded, very fragile, crumble very easily and are highly porous.
Sq3 Firm Most aggregates break with one hand	A mixture of porous aggregates from 2mm -10 cm; less than 30% are <1 cm. Some angular, non-porous aggregates (clods) may be present	Macropores and cracks present. Porosity and roots both within aggregates.			 Low aggregate porosity	 Aggregate fragments are fairly easy to obtain. They have few visible pores and are rounded. Roots usually grow through the aggregates.
Sq4 Compact Requires considerable effort to break aggregates with one hand	Mostly large > 10 cm and sub-angular non-porous; horizontal/platey also possible; less than 30% are <7 cm	Few macropores and cracks All roots are clustered in macropores and around aggregates			 Distinct macropores	 Aggregate fragments are easy to obtain when soil is wet, in cube shapes which are very sharp-edged and show cracks internally.
Sq5 Very compact Difficult to break up	Mostly large > 10 cm, very few < 7 cm, angular and non-porous	Very low porosity. Macropores may be present. May contain anaerobic zones. Few roots, if any, and restricted to cracks			 Grey-blue colour	 Aggregate fragments are easy to obtain when soil is wet, although considerable force may be needed. No pores or cracks are visible usually.

Key indicators:

Friability

Aggregate shape and stability

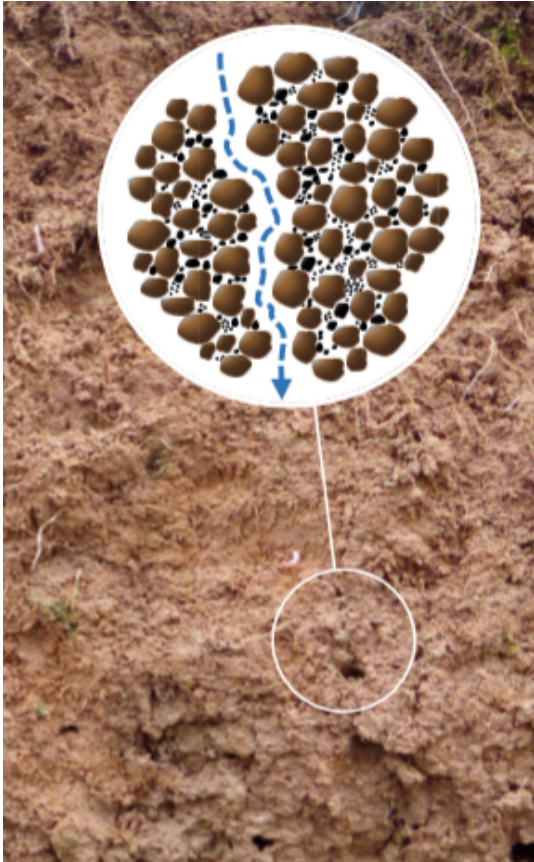
Porosity

Colour (related to carbon)

Root length and distribution

Aggregates and soil drainage

Soil organic matter creates and stabilises porous soil structures





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