Source: Farmer's Footprint Australia

Regenerating the Farm

Regen Ag and Carbon Farming

April 2023

REGENERATIVE AUSTRALIAN FARMERS
PROMOTING HEALTHY SOILS

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Nerrena/
Tarwin Valley
Landcare

Topics

Introduction and Expectations

Part 1 – Regenerative Agriculture

Part 2 – Carbon Farming

Part 3 – Field Walk

Introduction

REGENERATIVE AUSTRALIAN FARMERS
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Regenerative Australian Farmers (RAF) is a leading facilitator and service provider for integrated agricultural solutions to build and monetise soil organic carbon, soil health and rural prosperity.

This includes cost effective soil carbon evaluations, soil carbon field coring, baselining expertise & targeted implementation plans to support long term soil carbon contracts. RAF is a member of the Australian Government's soil carbon methodology working group to further develop and refine measurement and reporting techniques and is linked to a global leader in remote sensing (satellite) of ground data including soil carbon.

Part 1 – Regenerative Agriculture

Regenerative Agriculture

- What is Regenerative Agriculture
- 4 Questions
- Soil Basics (physical, chemical, biological)
- Soil Testing (strategy, sampling, testing, interpretation)
- Five Principles of Soil Health

Resources

https://www.youtube.com/watch?v=DEeFTaNSQdE

FARMER'S FOOTPRINT

A PATH TO SOIL HEALTH AND FOOD INDEPENDENCE

DVD – From Horse Paddock to Living Soil – The soil development of an Australian Demeter Biodynamic market garden.

Converting soil in 75 days

Regenerative Agriculture

FROM THE GROUND UP

What is Regenerative Agriculture?

HOW IT WORKS

In short, regenerative agriculture is a system of farming principles and practices that seeks to rehabilitate and enhance the entire ecosystem of the farm by placing a heavy premium on soil health with attention also paid to water management, fertilizer use, and more. It is a method of farming that "improves the resources it uses, rather than destroying or depleting them,"

In addition to a long list of incredible benefits for farmers and their crops, regenerative agriculture practices help us fight the climate crisis by pulling carbon from the atmosphere and sequestering it in the ground.

~~SUSTAINABLE AGRICULTURE~~

Question #1

interactive

1. Where are we/you now?

- Ecosystem
- Biodiversity
- Agricultural viability, productivity and profitability
- People/community
- Future trends

Question #2

2. How did we get here?

- Key measures or indicators
  - Environmental Sustainability
  - Spiritual/Human Fulfilment
  - Social/Community
- Assumptions

Question #3

3. Where do we want to be (our vision)?

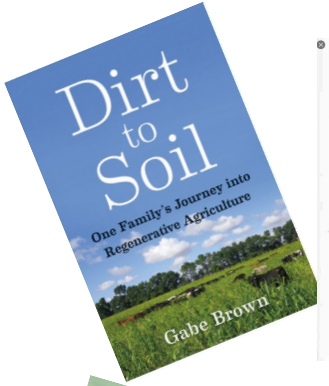
- LandCare Group
- Our farm
- Catchment
- Region/National level

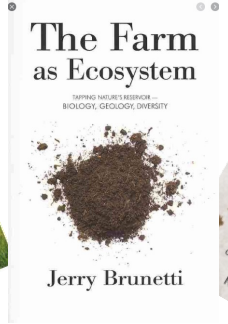
Question #4

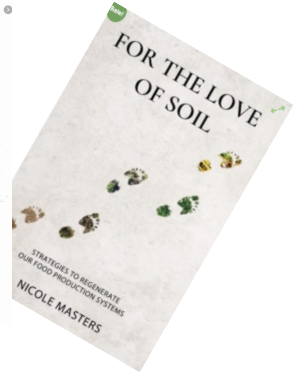
4. How do we get there?

- ?
- ?

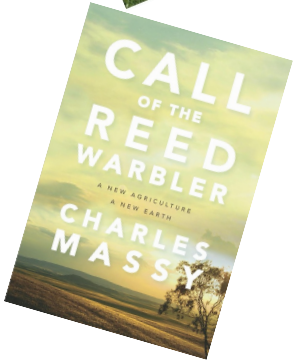
Resources

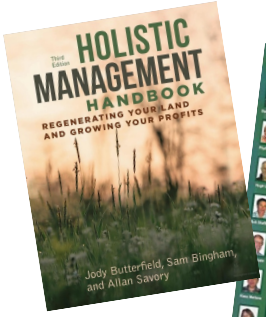




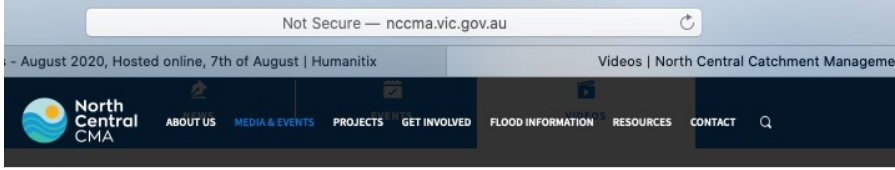



Australian made Soil Water Infiltrator Tester






Garlic Press & Optical Refractometer (Brix meter)



Videos available on CMA website

https://www.youtube.com/user/TheNorthcentralcma/videos

Down & Dirty with Dung Beetles

Dr Bernard Doube, Dung Beetle Solutions International brings us up to date with dung beetle species, the history of introduction to Australia and the benefits to agriculture. This presentation was delivered in June 2020 with the support of Landcare Victoria and North Central CMA.

2020 Seasonal Outlook - Grain & Hay Markets

2020 Seasonal Outlook - Cropping

2020 Seasonal Outlook - Climate Update

2020 Seasonal Outlook - Irrigation Water

Regen Ag - Nats & Jono

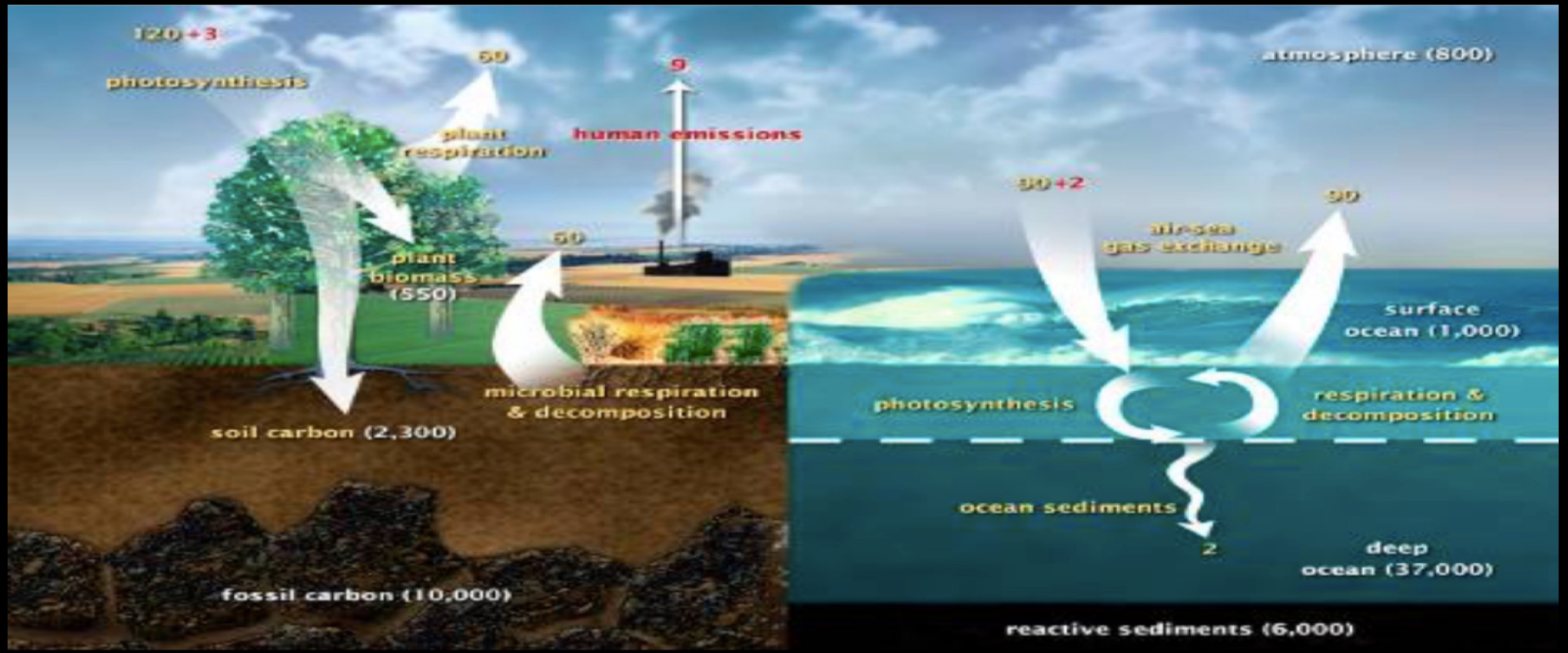
Regen Ag - N, P & Manure Trial

Regen Ag - Dick Richardson

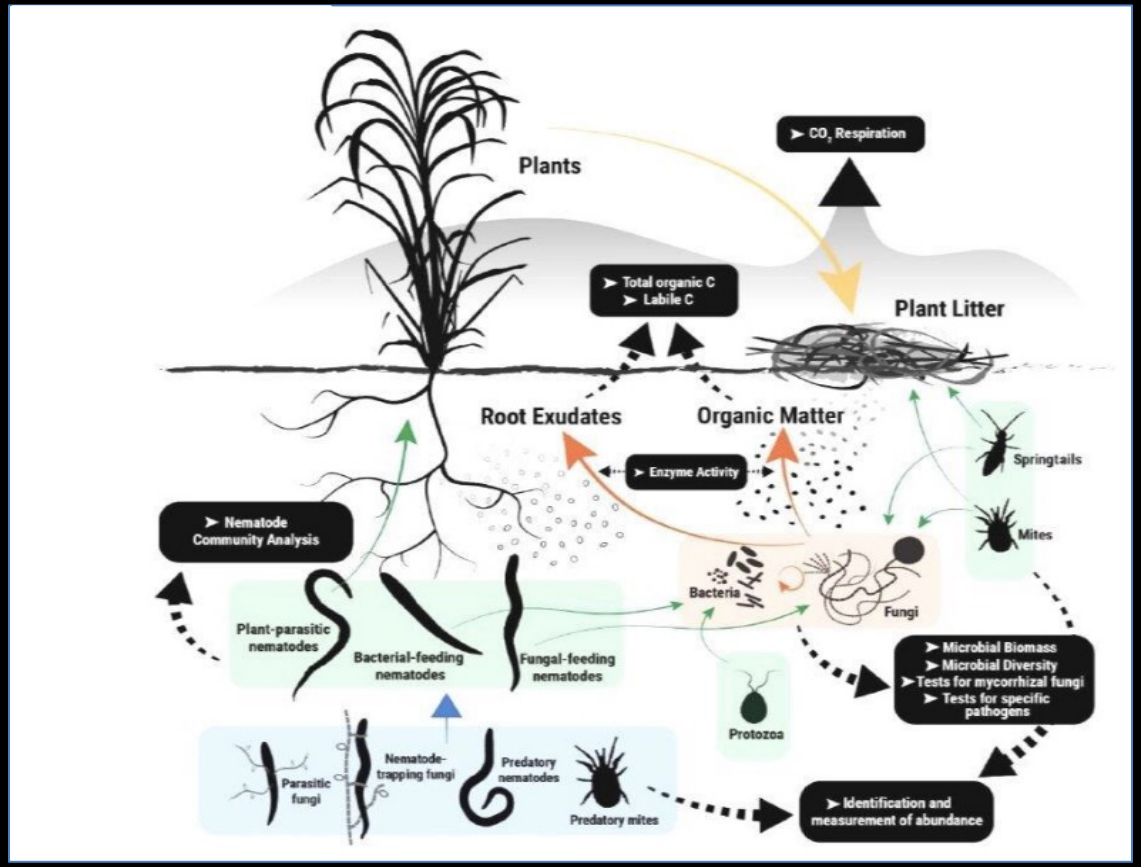
Regen Ag - Colin Seis Part 3

Regen Ag - Colin Seis

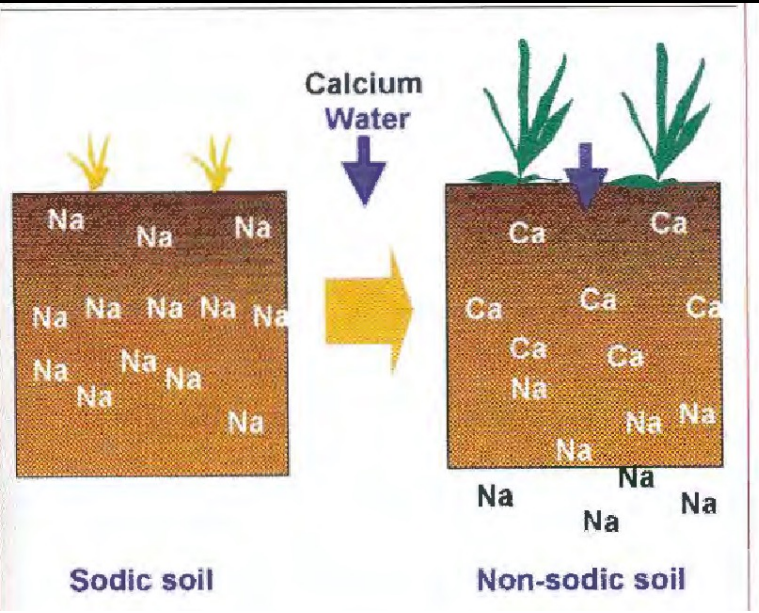
Carbon Cycle - planetary



Soil / Mineral Cycle



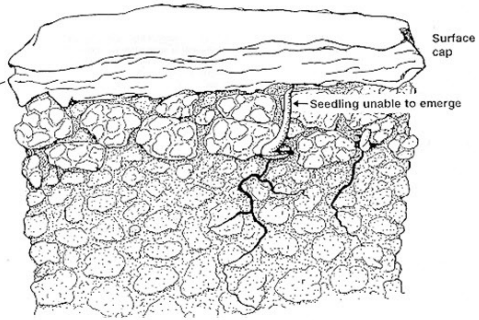
Sodic Soils (cont)



Surface crusting & dispersive soils

Impacts of dispersive clay
- surface crusting impacts on seedling emergence

Fine particles form a crust



Adding Gypsum ($CaSO_4 2H_2O$) helps provide soluble calcium to replace the exchangeable sodium* and make the relatively insoluble calcium carbonate (more common in sodic soils) available to replace sodium, similarly for magnesium. *can adversely effect plant growth

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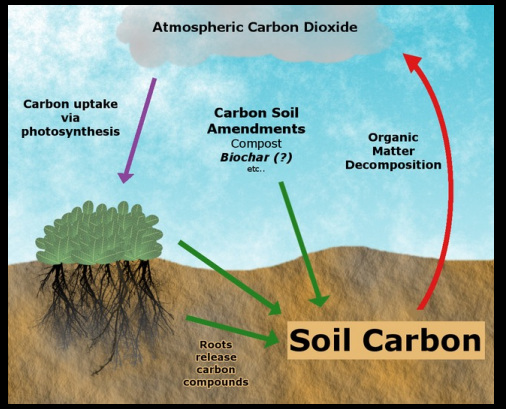
pH is a figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acidic and higher more alkaline. The pH is equal to $-\log_{10}c$ where c= **hydrogen ion concentration** in moles per litre.

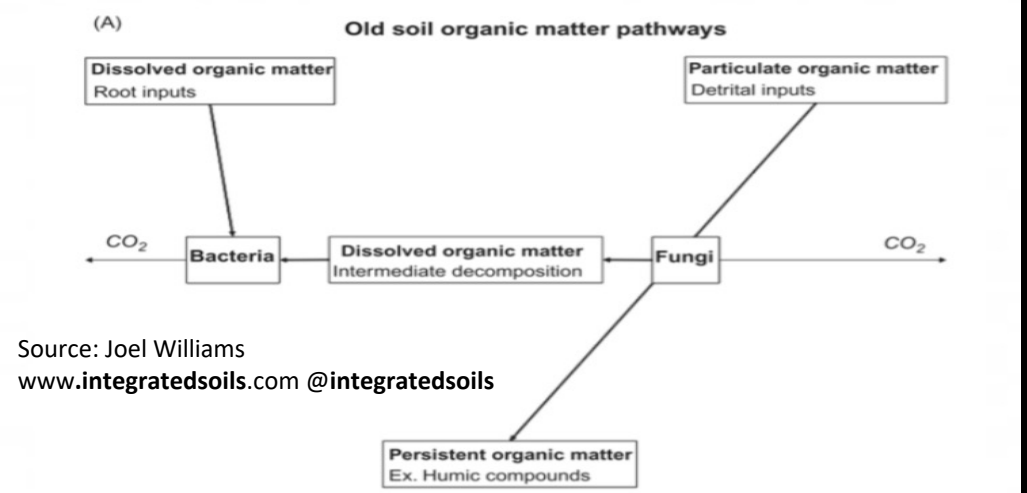
Living Soil – essential component is organic carbon

Key Functions & Soil Processes

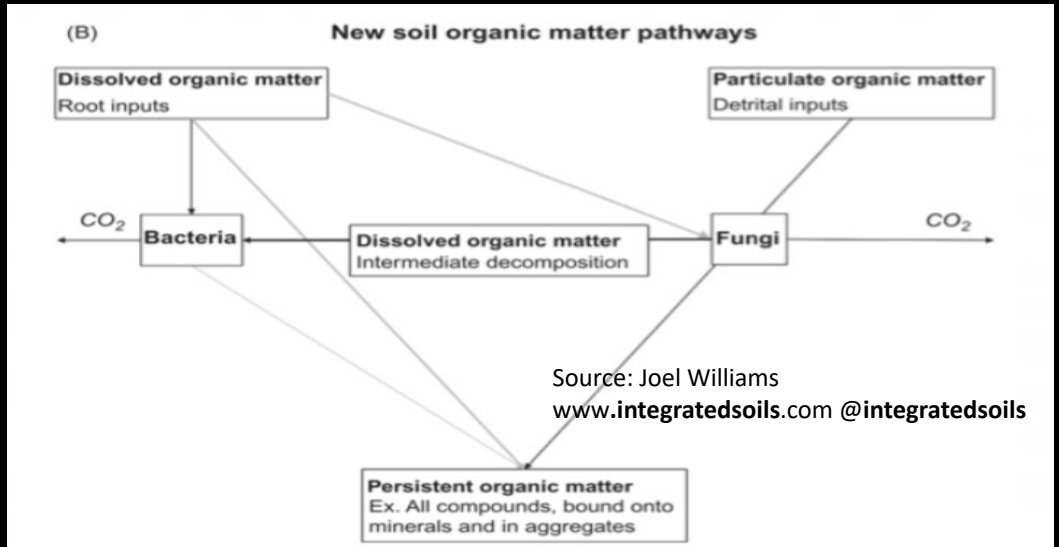
Soil health indicators

biological	Soil organic matter
	Respiration
	Soil biota biomass
	Microbial biomass C & N
	Potentially mineralizable N
	Enzyme activity
chemical	pH; rate of acidification or alkanisation
	Electrical conductivity; leachable salts
	Adsorption & cation exchange capacity
	Plant available N, P, K, S
physical	Porosity
	Aggregate stability
	Infiltration
	Bulk density
	Soil & rooting depths
	Soil available water & distribution
	Soil surface cover





Source: Joel Williams
www.**integratedsoils**.com @**integratedsoils**



Source: Joel Williams
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Soil Testing

- What are we testing and why ?
- How to collect the soil samples and when? What is representative?
- What tests are preferred and by whom?
- Interpreting test results is key

Demystifying Your Soil Test

The C:N ratio

- Naturally sourcing carbon and nitrogen (organic) using existing expertise and infrastructure, cheaper, more effective
- Lower C:N ~23 (grow biomass)
- Higher C:N >30 (increases C, soil organic matter)
- Protein (growth) = N + C + water (H_2O> O,H)
- Biodiversity is key (avoid mono-culture)
- Cover cropping (annuals) vs Pasture cropping (perennials); Summer vs Winter
- Liquid carbon assisted by microbes: photosynthesis, sugars to roots, exudates, transfers to soils, humification, stored organic carbon

rainwater vs dam water

Cover Crop Plant	C:N	Focus
Ideal microbial diet	24:1	Soil repair
Cereal rye*	80:1	High biomass
Annual vetch	11:1	Excellent stock feed; fixes large amount of N, releases soil phosphorus, beneficial insects (flowers)
Daikon (tillage raddish)*	19:1	Biological subsoil aeration
Clover	21:1	
Forage brassica*	12:1	High protein, very digestible, helps control weeds
Annual ryegrass	20:1	

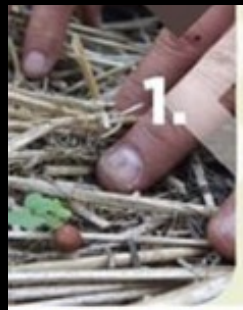
- *helps chemically control weeds, shading & competition

For Soil Biology Priming	Mix (Kg)	
Oats	50	
Field peas	10	
Lentils	10	
Vetch	10	
Tillage raddish	3	
Raddish	1	

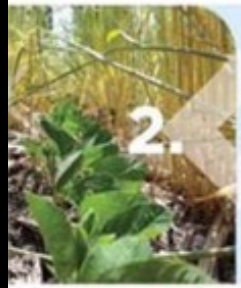
Sources:

- Colin Seis
- Gabe Brown (Dirt to Soil)

Summary - Five principles of soil health



1. **SOIL COVER:** ***Keep plant residues on the soil surface.*** Look down, what percentage of your soil is protected by residue? Erosion needs to be minimized before you can start building soil health.



2. **LIMITED DISTURBANCE:** ***Minimize tillage as much as possible.*** You will start building soil aggregates, pore spaces, soil biology, and organic matter.

3. **LIVING ROOTS:** ***Keep plants growing throughout the year to feed the soil.*** Cover crops can add carbon to the soil, providing a great food source for micro-organisms. Start small to find the best fit for your operation.

4. **DIVERSITY:** ***Try to mimic nature.*** Use cool and warm season grasses and broad leaf plants as much as possible, with three or more crops and cover crops in rotation. Grassland and cropland plant diversity increases soil and animal health.

5. **INTEGRATING LIVESTOCK:** Fall/winter grazing of cover crops and crop residue increases livestock's plane of nutrition at a time when pasture forage quality can be low, increases the soil biological activity on cropland, and improves nutrient cycling. Proper grassland management improves soil health.

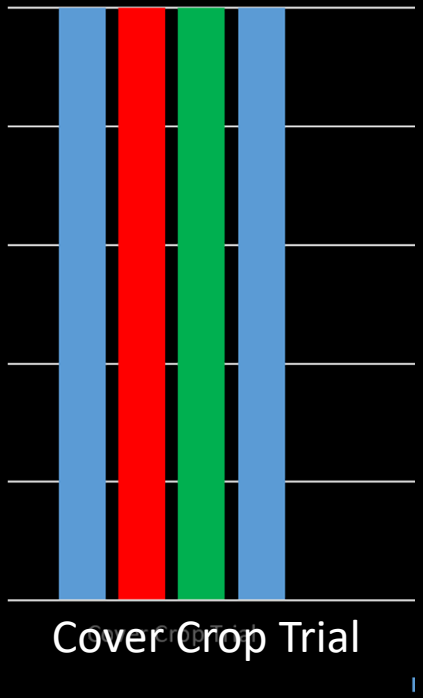
Source: 'Dirt to Soil'
- Gabe Brown

https://kisstheground.com/thesoilstory/

https://www.youtube.com/watch?v=K3-V1j-zMZw

Soil Carbon Cowboys (12 m)

Trials – a planned approach



Comparative trial with cover crop, nutrisoil and biochar – with and without water (sprinkler)

Case Study: Elmore (sheep grazing)

BEFORE