A New Twist on Soil Carbon

Andy Gulliver

AIH Horticulture & Humanity Conference
September 21, 2019

www.cwise.com.au
Knowledge and Experience           Innovative Ideas            Practical Solutions
What We’ll Cover (100 years and 10 years)

• Why is soil carbon good?
• How does it get there?
• How can it help me?
• How can we manage it?
• Something very different
• The age of biology is coming.....

The MICROBIOME

www.cwise.com.au
Life On Earth is Carbon Based

- Plants capture energy from sun
- Energy stored in carbon in plants
- This energy drives living processes
- Thin layer of top soil supports all life on earth

www.cwise.com.au
Why is Soil Carbon Important?

• Affects nearly every soil factor positively

• Supplies energy and supports life

• A ‘sponge’ and ‘buffer’

• Acts as a shock absorber

• Creates ‘resilient’ soils

• Supports soil and plant health

www.cwise.com.au
REGENERATIVE AGRICULTURE

(noun)

describes farming and grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle.

Specifically, it is a holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle, and build soil health, crop resilience and nutrient density.
Charting the "Great Acceleration" in human activity from the start of the industrial revolution in 1750 to 2010, and the subsequent changes in the Earth System. Illustration: Steffen et al. 2015. and F. Pharand-Deschênes/Globaia
What did Cutler say?

“The depletion of the soil humus supply is apt to be a fundamental cause of lowered crop yields.”

Hills, Jones and Cutler, 1908
The Soil in Balance

- Chemistry
  - Nutrient Supply
  - Nutrient Retention
  - pH Control
- Physics
  - Water Retention
  - Drainage
  - Aeration
  - Compaction
- Biology
  - Nutrient Recycling
  - Disease Control

Courtesy of Chemistry Centre, WA

www.cwise.com.au
Management Out of Balance

Courtesy of Chemistry Centre, WA

www.cwise.com.au
What did Roosevelt say?

“The Nation that destroys its soils destroys itself”

Franklin Roosevelt
Letter to all State Governors on a Uniform Soil Conservation Law
(26 February 1937)
The Status Quo?

Dust storm approaching Silverton (near Broken Hill, NSW), 23 March 2008 (photo Stan Dineen)
The test of the morality of a society is what it does for its children.

-Dietrich Bonhoeffer
Soil Organic Carbon particularly humus...

- Plays a role in all key soil functions
- High CEC – holds nutrients in soil
- Important in supplying nutrients
- High water holding capacity
Which results in improved:
- Water use efficiency
- Fertiliser efficiency
- Pest and disease resistance
- Soil and crop performance

........and don’t forget the biology
What did Cutler say?

“The depletion of the soil humus supply is apt to be a fundamental cause of lowered crop yields.”

Hills, Jones and Cutler, 1908
Where do composted products fit?

- “Carbon Concentrate”
- The right type of carbon
Soil Organic Carbon

Improves:
• Capture and use of rainfall
• Fertiliser efficiency
• Soil biology
What did Garnaut say?

- “The most significant opportunities may be in the area of soil carbon sequestration”

Ross Garnaut
Garnaut Report
30th September 2008
What else did Roosevelt say?

“The country needs and, unless I mistake its temper, the country demands bold, persistent experimentation.

It is common sense to take a method and try it: If it fails, admit it frankly and try another. **But above all, try something.**”

(22 May 1932)
We think we are 100% human but...

- 5-10% bacteria by weight
- 90% bacteria by cell number
- Limited human genome

- Genetic diversity in bacterial populations provides multiple benefits to humans.
- So are we more bacterial than human?
- Or at least healthy humans are!

Are ‘they’ our bacteria or are we their human?
Are we that different from plants?

Bacteria are important for our health
Is the soil the ‘stomach’ of the plant?
We’re not that different

Bacteria are important for...

- Growth and Development
- Nutrient acquisition
- Growth hormones
- Vitamins
- Health
- Protection from disease
- Resistance to stress

Microbes are central to nutrition

Many distinct micro-environments

Open systems with high surface area

Active communication between host and microbes

BIOLOGY IS IMPORTANT
There is a Better Way

• For our economies
• and our environment
• and our communities