

## **Intro.**

-Rich soil is the key to enabling small, sustainable farms to compete against heavy mechanisation, cheap labour and subsidies. High output with low inputs of weeding, water, fertility, fossil fuels. Many small scale farms are doing it wrong at the moment.

-Moving towards a soil enhancing and renewables economic foundation; income generation from systems which increasingly enrich soil. (Because an economic foundation which depends on subsidised fossil fuel dependence is a silly idea).

-Understand the basic principles (SCIFs) in order to develop site specific systems incorporating as many SCIFs as possible.

-Understand the meaning and many implications of the word 'soil aggregation'.

-There is only one viable carbon sink for climate change mitigation: Soil.

# Why understand SCIFs?

## Soil

- Erosion.
- Degradation.
- Aggregation.
- CEC, Surface area.
  - Water retention.
  - Water wicking.
- Nutrient Retention.
  - Input costs.
  - Pollution avoidance.
- Weed control.
- Crop yields.
- Nutrient Density.
  - Crop flavour.
  - Crop Disease resistance.

## Climate

# Why understand SCIFs?

Soil

Climate

A lot of people will die if we go above 1.5C .

We might all die if we go above 4C.

Soil is the only viable carbon sink.

0.4% Soil C increase in global ag soils without considering carbonic acid release.

2% Soil C increase with.

# Soil Carbon Influencing Factors

Political  
Decisions

Consumer  
Wisdom

Natures  
forces

Subsidies

Spending

Climate

Accountability

Soil aggregation

# Soil Carbon Influencing Factors

## **Stable Soil Carbon**

Humic Substances

## **Labile Soil Carbon**

Amino acids/sugars

# Soil Carbon Influencing Factors

## Stable Soil Carbon

Humic Substances

Enzyme Keys (Schmidt)

Root Exudates and Glomalin

Optimum Photosynthesis

Crop Health

Mob Grazing and WFM

Agroforestry and Perennials,

Alley Cropping (Mark Sheperd)

Cultivation

Fertilisers

Biocides

## Labile Soil Carbon

Amino Acids/Sugars

# Soil Carbon Influencing Factors

## Stable Soil Carbon

Humic Substances

## Labile Soil Carbon

Amino Acids/Sugars

Compost Decomposes (C. Jones)

Opportunist microbes

R vs K strategists

## Biological Influencing Factors

Fertilisers,

Temperature

Air

Biocides

Water

Mechanical Influences

Earthworm calcification

Biochar

# Application

3 Stage Approach to Soil C:

Minimise Release

Max Photosynthesis

Max Retention



# Application

## 3 Stage Approach to Soil C:

Minimise Release

Max Photosynthesis

Max Retention

Stop:

Aggregation Destruction

Biocides and Fertilisers

Bare Soil (mulch)

Hot Composting

# Application

## 3 Stage Approach to Soil C:

Minimise Release

Max Photosynthesis

Max Retention

Water Reticulation;  
Swales, Fanya Ju and  
Keyline cultivation.

Coppice

Perennial Strips  
Alley Cropping

Cover crops vs Green Manures

# Application

## 3 Stage Approach to Soil C:

Minimise Release

Max Photosynthesis

Max Retention

Water Reticulation;  
Swales, Fanya Ju and  
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Cover crops vs Green Manures

## Full Cycle Biochar

- Recalcitrance.

- Adsorptive.

  - CEC.

  - Surface area.

- Inhibition of opportunist soil microbes

- Terra preta.

  - 9% biochar.

- Large increase in natural background soil C.

- Combined Heat and Biochar (CHB).

- Cookstove program.

  - TLUD stoves.

  - Anila stoves.

- Indoor stove systems.

  - Rocket stove hybrid.

- Appropriate scale tech.

  - Coppice burning stoves.

## Putting it Together An Example:

1; Alley Cropping using contours.  
No walk, min dig raised beds or  
Conservation tillage system.  
rotation over beds.  
Transported vs Living mulches.  
Living mulch root depth.  
Coppice crops between alleys.

plus 2; Biochar Stove Systems.  
To burn coppice from alley cropping.  
TLUD outdoor and/or  
Rocket Hybrid, attached to flue outlet indoor.

plus 3; Appropriate use/return of the Biochar.  
To stabilise mulch material  
Or  
To encourage deeper roots.

# Conclusion

-If you're doing something backwards then reverse it. With reverse systems, the more you consume the more you mitigate climate change.

-By reversing the way we farm with respect to C, i.e. farming in ways which cause C to become stabilised not released as CO<sub>2</sub>, farmers are helping consumers to live within the Earth's carrying capacity.

-We do not have an over-population problem. We have a problem with consumer habits. If anybody here is planning a cull then think again, we are probably going to need 7bn people eating and consuming C neg produce if we are to mitigate climate change.

-Composting is a waste of time as far as soil C is concerned unless you live in Chernobyl, the Tundra or a peat bog. UNLESS you make and use compost wisely to promote root exudates or you use biochar as an admix.

-We are supposed to love the life on Earth. Love is not an abstract concept, it must involve action or work. Work to interact in a balanced dynamic with the Earth must involve knowledge of SCIFs.











