Growing Life: Regenerative Biodiverse Organic Agriculture as a Climate Solution

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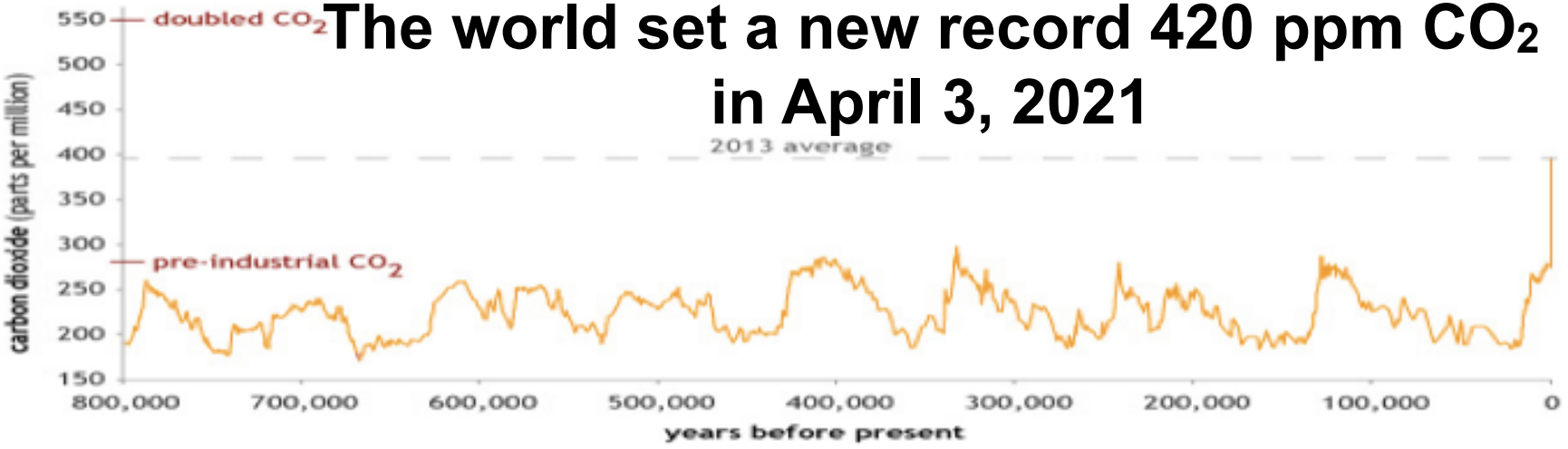
Regeneration International

"Regeneration for Climate Resilience"
Navdanya International, October 29, 2021

The world set a new record 420 ppm CO_2 in April 3, 2021



- The last time the world had 380 ppm, based on evidence from 3.0–3.5 Million years ago - **5 to 16 C warmer (28.8 F)** (Rohling et al. Nature)

- **Sea levels were 20 to 30 meters higher (65 to 100 ft)**
- Getting worse despite the Paris agreement
- CO_2 levels are increasing by 2 to 3.3 ppm per year - **reached a record of 420 ppm**

- **Paris target of Net Zero Emissions by 2050 will mean close to 500 ppm**

We are looking at crossing the multiple tipping points of catastrophic climate change

Net Zero Emissions is not enough
We need negative emissions NOW!

According to WMO Secretary-General Michel Jarraud
"Carbon dioxide remains in the atmosphere for ***hundreds of years*** and in the ocean for even longer. Past, present and future emissions will have a cumulative impact on both global warming and ocean acidification."

The extra heat becomes a huge amount of extra energy fueling our planet's weather systems. **The equivalent of millions of atomic bombs of energy**

It means violent and extreme weather events such as storms, droughts, fires, floods and crop failures become more intense and more frequent.

This is happening now!

Net Zero Emissions is not enough
We need negative emissions NOW!

Soils are the greatest carbon sink after the oceans

Over 2700 Gt of carbon is stored in soils worldwide

Biomass 575 Gt most of which is wood. Source (Lal 2008)

Atmosphere 900 Gt

1 Gt (gigaton) = 1 billion tons

It would be most logical to remove the CO_2 from the atmosphere and put it into the soil – where it is needed

We Must Drawn Down CO_2 Now!

Ending fossil fuels and adopting renewal energy must be non-negotiable

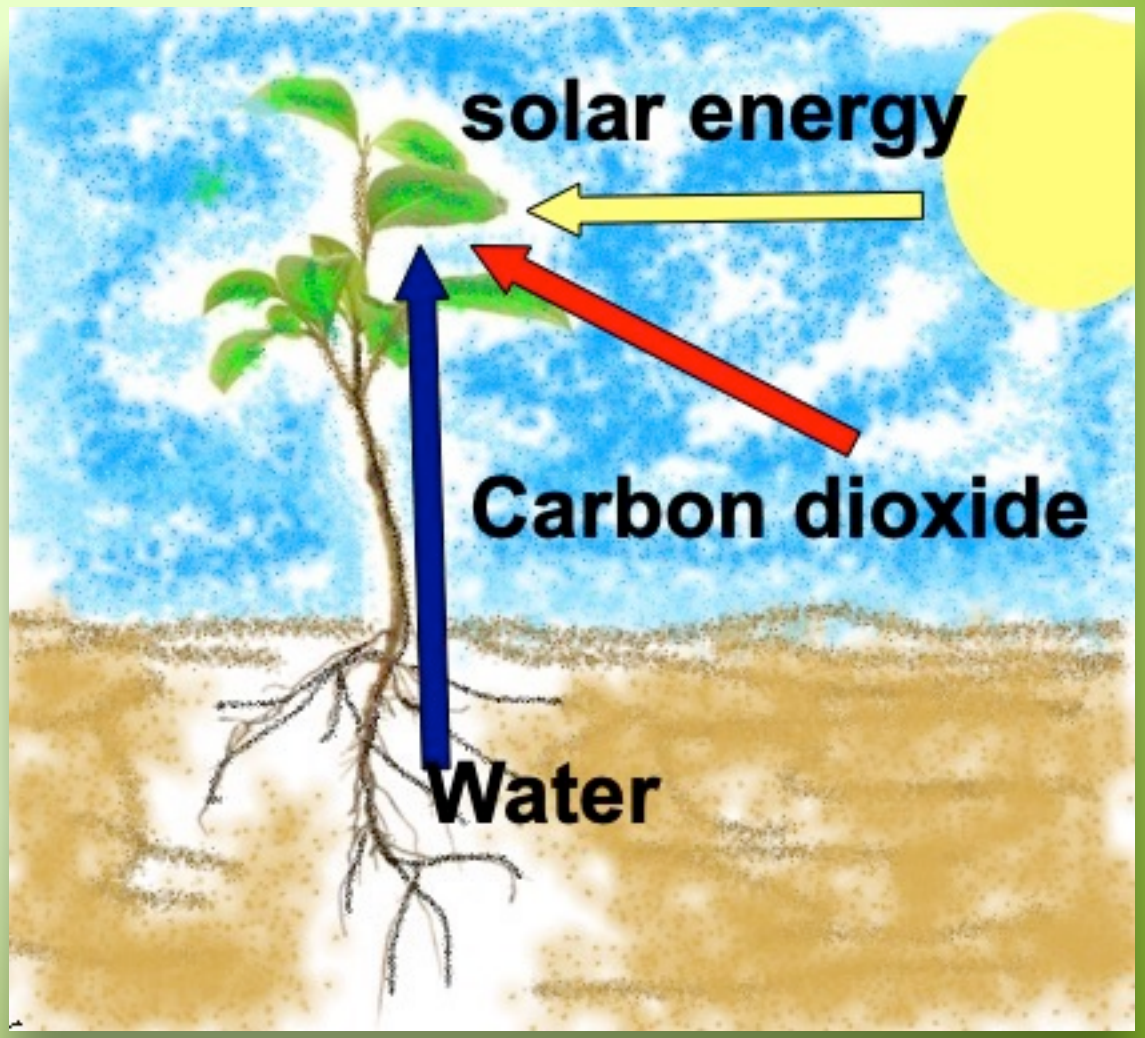
However this will not stop catastrophic climate change

Need to draw down more than 26 Gt of CO_2 per year from the atmosphere just to stabilize CO_2 levels at around 420 ppm

Further scaling up past 30 Gt needed to reduce CO_2 levels

Maximize Solar Energy

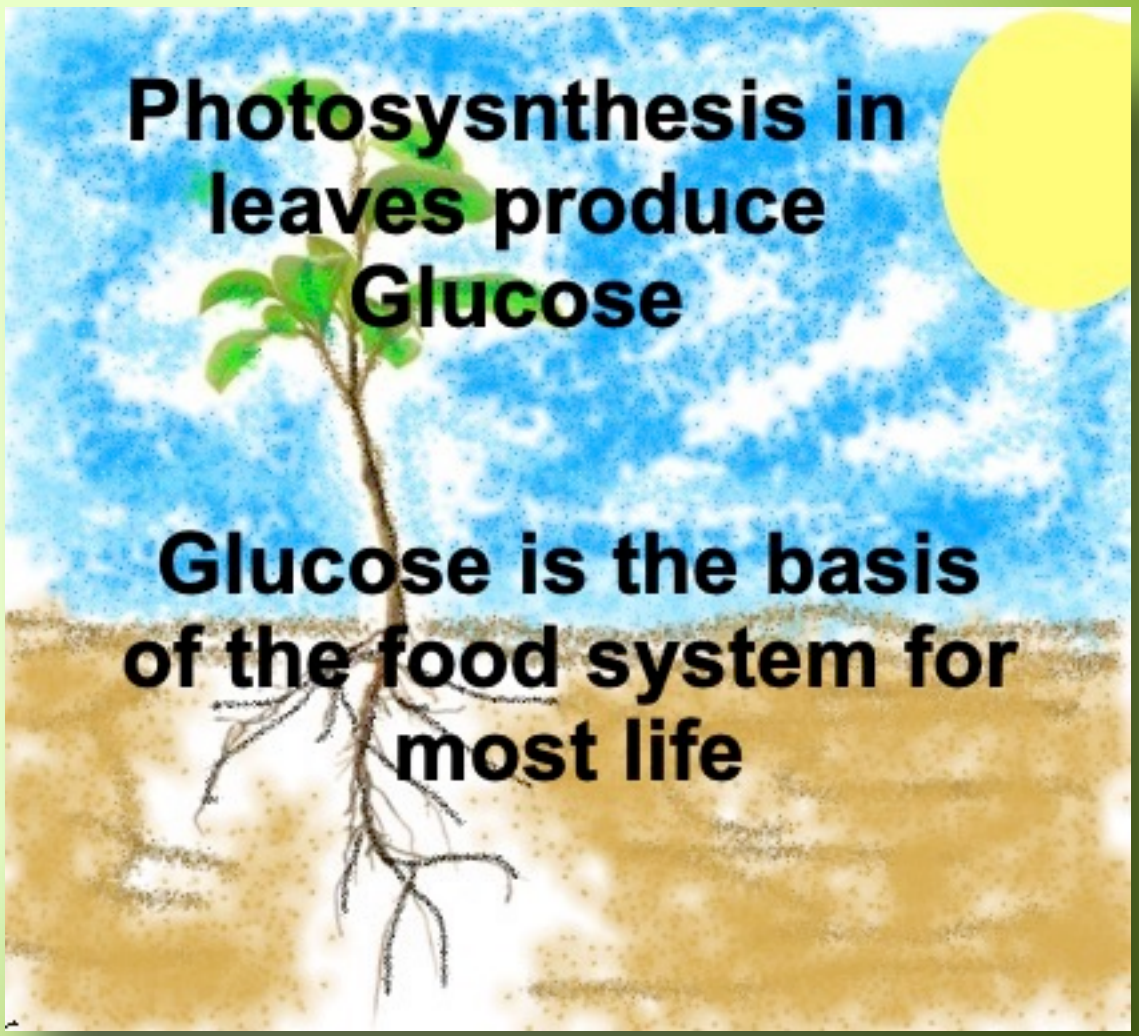
How can agriculture help to reverse climate change?



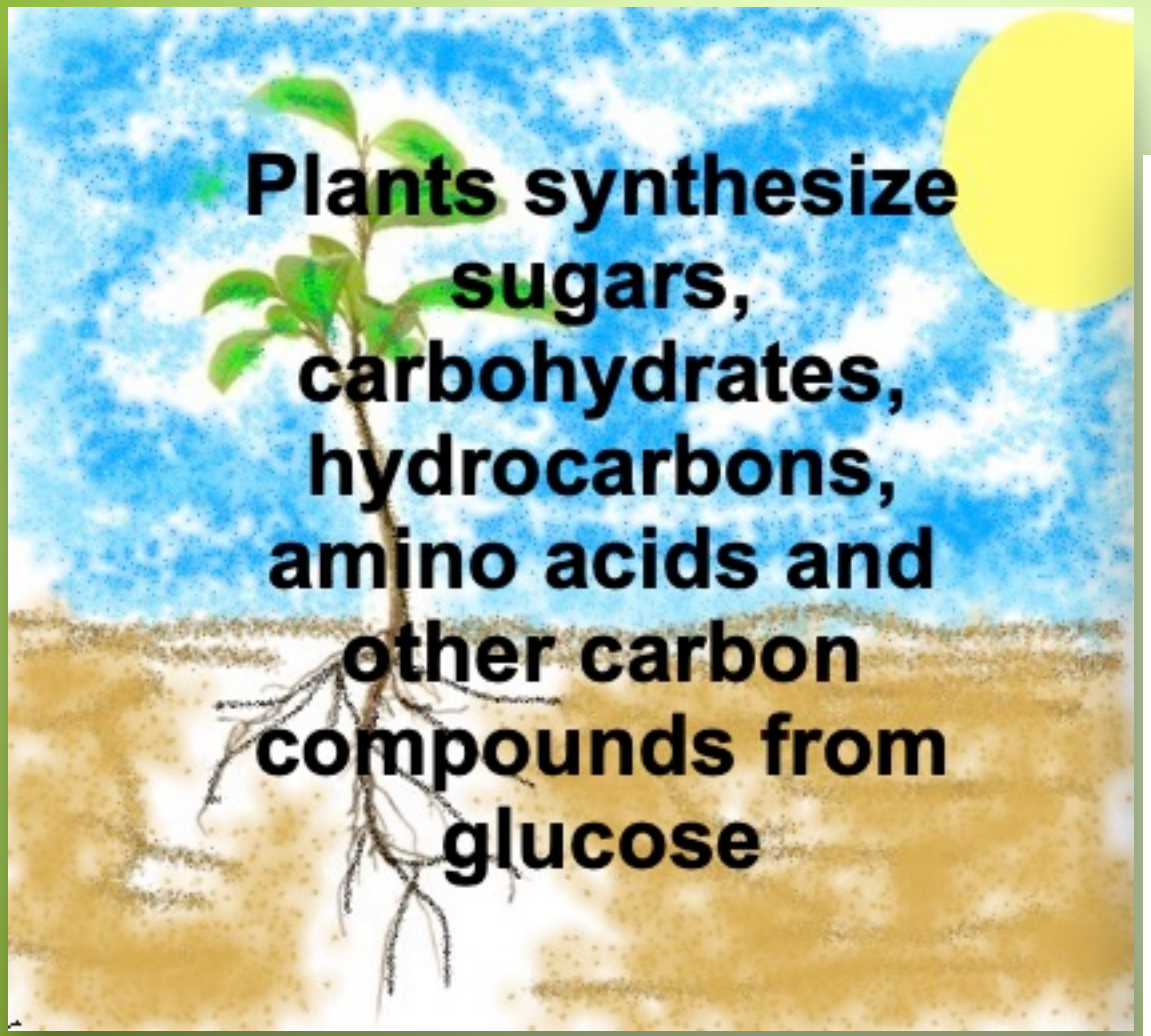
Maximize Solar Energy

We use
solar energy
to power
photosynthesis
by combining
CO_2 and
water to
create the

Molecules of Life



Maximize Solar Energy

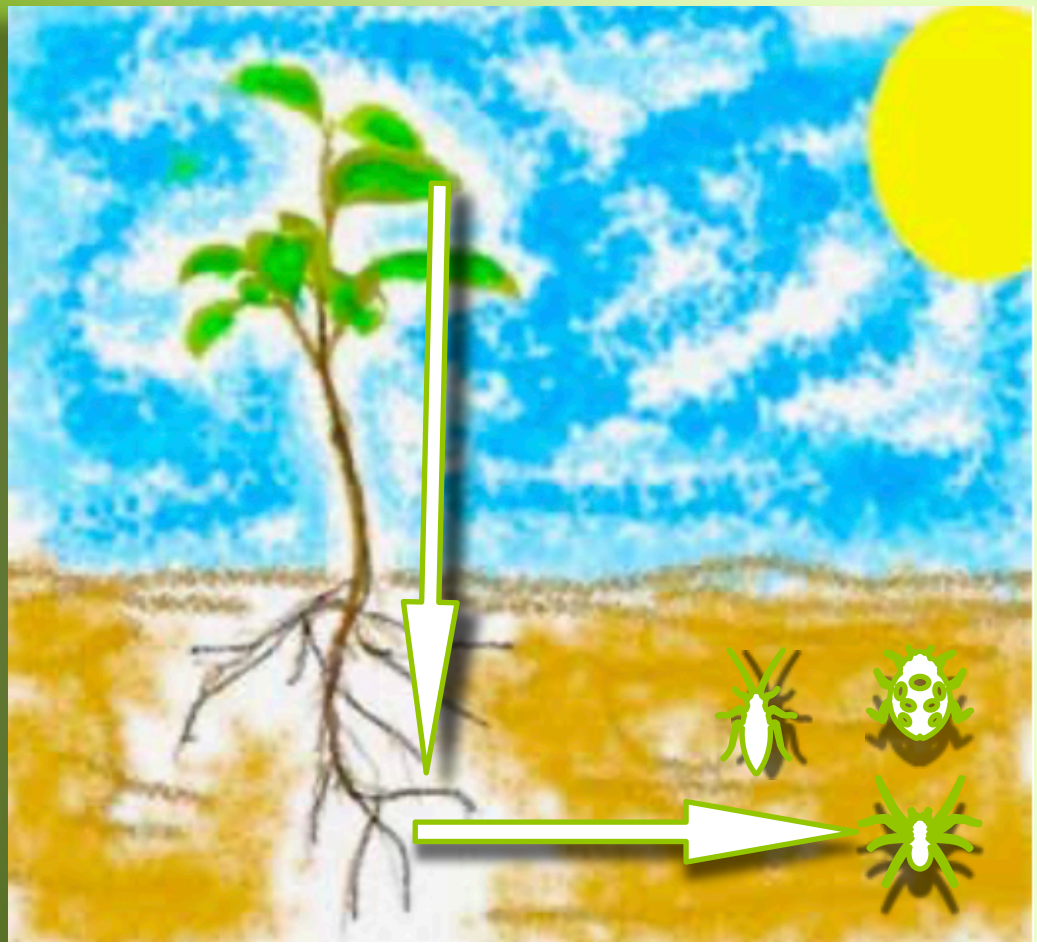


Glucose is the key Molecule of Life

It is the basis of all the other **Molecules of Life**,

the compounds that all living entities need to grow, reproduce and to stay alive!

Maximize Solar Energy

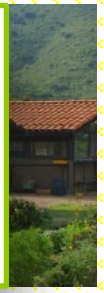


- 95-98% of a plants biomass is composed of the molecules of life
- Made through sunlight, water and CO_2

Around 30 percent of carbon compounds are secreted through the plant's roots to feed the soil microbiome.

This is called the liquid carbon pathway, or the "carbon gift."

Plants feed from their leaves to feed their roots
The more leaves - the more food to grow roots
Cutting leaves forces plants to shed roots

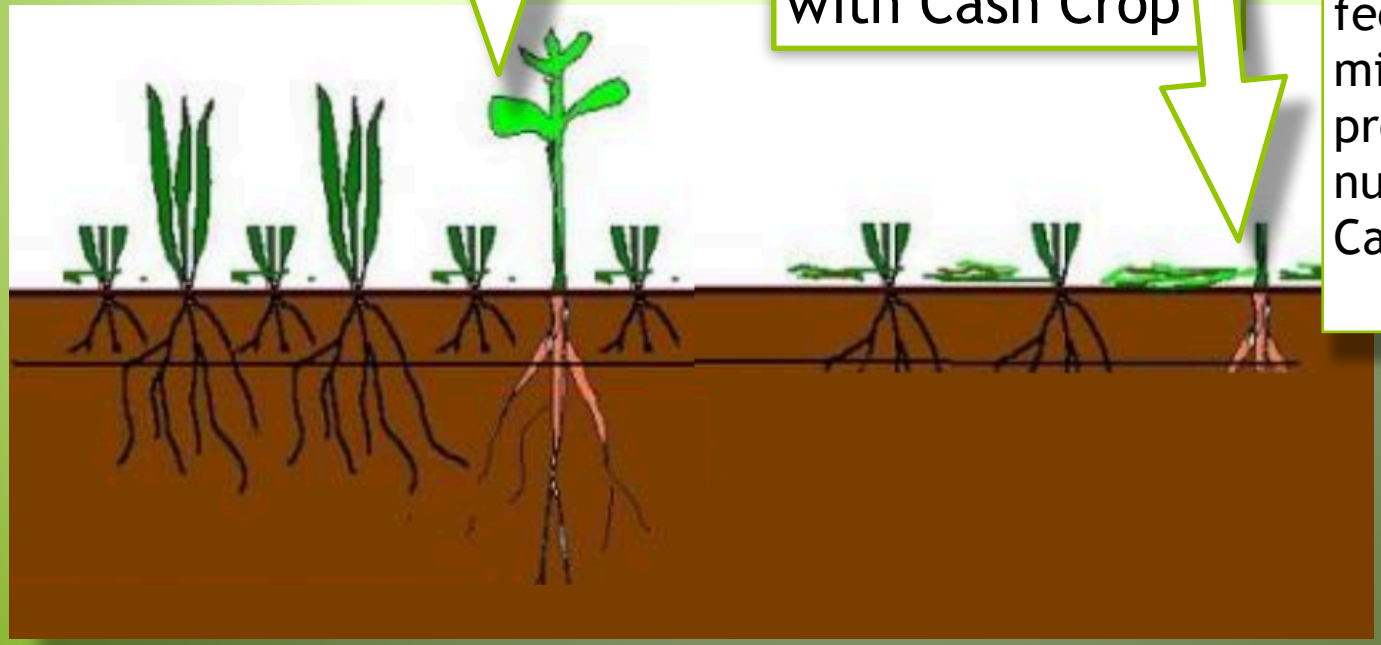


- Root exudates feed soil microbiome
- Root enzymes and acids extract minerals from rocks
- Builds soil structure and deepens soils
- Generates soil carbon and nutrients for the crop through correct management

MANAGING COVER CROPS

Cash Crop has primary access to sunlight and water

Cover Crop is grazed or mulched to reduce root, sunlight, water competition with Cash Crop



Cash Crop
A crop that we eat, swap or sell

Cover Crop
A crop we grow to feed the soil microbiome to produce fertility/ nutrients for the Cash Crop

Dead plants do not photosynthesize
Only living plants produce the molecules of life

A Cover Crop - Using solar energy and biology to grow fertility
Tropical perennial grasses and legumes in a Rambutan Orchard
They provide nitrogen and large amounts of organic matter to feed the soil microbiome, improve soil fertility, soil organic matter levels, sequestering CO_2 - to feed the cash crop

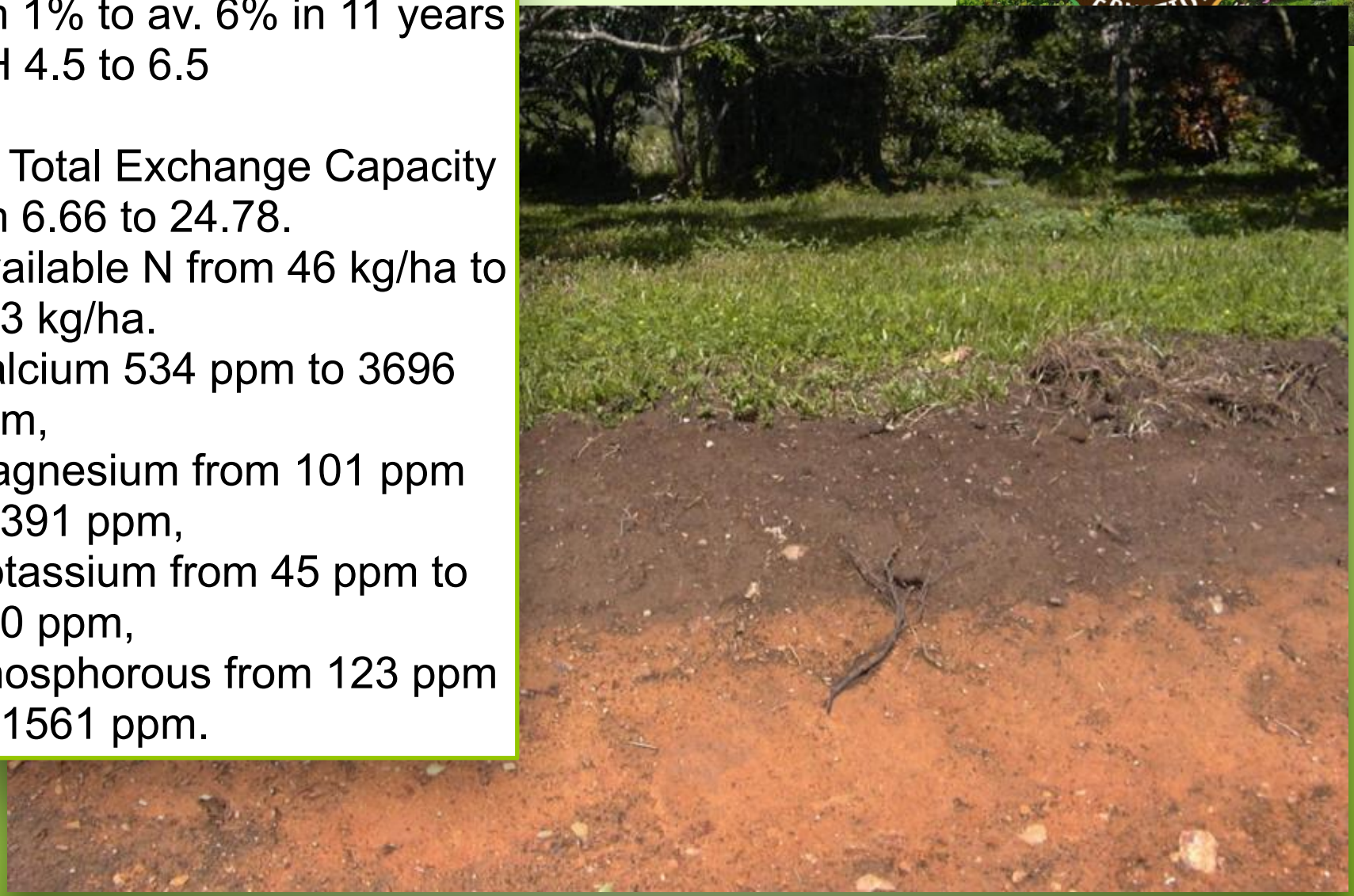
Building Topsoil

Soil organic matter increased from 1% to av. 6% in 11 years

- pH 4.5 to 6.5

The Total Exchange Capacity from 6.66 to 24.78.

- Available N from 46 kg/ha to 123 kg/ha.
- Calcium 534 ppm to 3696 ppm,
- Magnesium from 101 ppm to 391 ppm,
- Potassium from 45 ppm to 230 ppm,
- Phosphorous from 123 ppm to 1561 ppm.



Pasture Cropping - No Kill No Till

Sowing annuals into perennial pastures

Oats Sown into Pasture
Only a little bit of phosphate was added due to deficient soils

Gives the same yield as intensive plowing, spraying and fertilizers, at a fraction of the cost
Animals can go back on pasture after harvest- giving two crops and double income

Pictures: Colin Seis

Pasture Cropping - No Kill No Till

Dr Christine Jones has conducted research at Colin Seis's property in Australia **An average of 16.85 tons/ ha (16,850 lbs/acre) of CO2 sequestered every year**

Increases in soil nutrients *Calcium 177%, Magnesium 38%, Potassium 46%, Sulphur 57%, Phosphorus 51%, Nitrogen 48%, Copper 102%, Zinc 86%, Cobalt 79%, Boron 56%, Molybdenum 51%, Selenium 17%*

SOIL CARBON

- **0 - 10cm 150%**
- **10 - 20cm 243%**
- **20 - 30cm 317%**
- **30 - 40cm 413%**
- **40 - 50cm 157%**

Soil Comparison between Winona and nearby property. Picture: Dr Christine Jones

Pasture Cropping - No Kill No Till

Soil Kee, Australia

- Sowing annual cover and cash crops in perennial pastures
- 11.2 and 13 metric tons of CO_2/ha/yr Verified by the Australian Government Soil Carbon Initiative
- Extrapolated globally across agricultural lands would sequester 55 Gt of CO_2/yr
- Large increases in production

Singing Frog Farm

The Kaisers have managed to increase their soil organic matter from 2.4% to an optimal 7-8% in just six years, an average increase of about 3/4 of a percentage point per year - Chico State University USA

Intensive No Kill No Till highly biodiverse agro-ecological certified organic vegetables on 2 acres - very high yields of high quality food with no toxic chemicals

Extrapolated globally across arable and permanent crop lands it would sequester 179 Gt of CO_2/yr

Why is policy change urgently needed?

We need to transition agricultural production to best practice regenerative organic systems

- **to sequester enough CO_2 to reverse climate change and restore the global climate.**
- **have negative emissions and bring the world back to the pre industrial revolution levels in a few decades**
- **produce higher yields of healthy food with no toxic chemicals**

These are shovel ready solutions!!!!!!!!!!!!!

Thank You