Soil Health and why it matters for Human Health

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Presented by

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Why soil health matters

The Gaia hypothesis

- Named after the Greek supreme god of Earth
- Is an ecological hypothesis that proposes that the biosphere of Earth behaves like one living organism with feedback systems to maintain homeostasis- from climatic and geological through to the interdependence of all life forms

What's in it for us

- Carbon sequestration
- Water retention-the driest continent on Earth
- Sustainability-we can feed ourselves
- Healthy plants-

Macronutrients

Micronutrients: Vitamins, minerals, EFAs

Macronutrients

- Proteins
- Carbohydrates
- Fats

Remember that most of our food begins in the oceans and the soil. Hydroponics the rare exception

Vitamins

- A plant can make a vitamin. The structure of a vitamin is a complex arrangement of simple elements: carbon, hydrogen, oxygen and nitrogen
- It can get most of these from the air and water. Under the dictation of genes, the healthy plant will produce vitamins, [something humans cannot do]
- We must eat the plant-or animal that has eaten it

Why does the plant do this?

- The main purpose of vitamins is to act as co-factors in vital enzymatic reactions
- One type of reaction involves protection from redox [free radical damage]
- The plant is protecting itself from the oxidative damage of the sun on which so many plants are dependent

Minerals

- Unlike vitamins-the plant cannot make a mineral
- The mineral must be in the soil, water supply- [or the ocean]
- One reason that sea vegetables are so spectacularly good for us is the abundance of minerals

The problem

- Not all soils are created equal
- Basalt soils are rich in the necessary minerals
- Soils weathered by glaciers grinding volcanic rocks often very rich [Joel Wallach "glacial milk"]
- River flats may be rich from topsoils washed from other farms

Agribusiness

- Crops remove the minerals they need.
- This includes calcium, magnesium, phosphorus, carbon, potassium, selenium, iodine, zinc, manganese, copper, cobalt, boron, germanium, vanadium
- Once the crop is sold-these are taken from the farm
- "fertilised" farms replace calcium, carbon, potassium, phosphate and nitrogen

Agribusiness

- If the plant can grow without the mineral- why would the farmer add it to his fields?
- His animals are too expensive to keep in to old age
- Does anyone remember how tomatoes and apples used to taste?
- Who has seen mutton, hoggett or aged beef for sale recently?

How mother nature used to do it

- Trees-

Shelter birds

Hold the topsoil together so that it is not lost to dust storms

Increase the water carrying capacity of the soil, protecting against drought

Roots break up rocks and release more minerals to renew soils

Mother nature [cont.]

- Trees renew topsoil with leaf litter. This in turn shelters moulds, fungi and micro-organisms
- These micro-organisms affect the pH of the soil, allow bacteria to fix nitrogen, incorporate carbon etc
- Birds eat the pests avoiding the toxic effects of agricultural chemicals

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Some facts

- A 2000 British study showed that from earlier analyses there was an overall decline:
  - of calcium in fruits and vegetables 46%, in broccoli it was 75%
  - of copper overall 75%
  - Carrots had lost 75% of their magnesium

Other examples

- 2001 Australian Organic retailers and growers found:

  Beans, tomatoes, capsicums and silver beet often had ten times or more the zinc, calcium, potassium, magnesium and iron when compared to the conventional product
- Japanese researchers found higher levels of Vit E, omega 3s and anti-oxidants in organic milk

And more

- CSIRO research published 2008 showed that adding superphosphate to wheat crop reduced the zinc content by 33-39 %
- The research suggested that phosphate destroyed arbuscular mycorrhizial fungi [AMF] which are required by the plant to access the zinc that is in the soil
- Canola damages AMF in a similar manner

Moreover-

- Remember that phosphate is a synthetic solution to the need for phosporus
- When inorganic nitrogen [synthetic fertilisers] is too easily available to plants they have less incentive to produce anti-oxidants- vitamins, bioflavonoids and anthocyanins
- Organic tomatoes had 79-97% more quercetin and kaempferol than commercially grown tomatoes

And in the USA

- A 2006 dept. of agriculture [USDA] study showed changes in wheat since new varieties introduced in 1873

[i] 36% less selenium

[ii] 34% less zinc

[iii] 28% less iron

- University of Texas 2004 studied 43 fruits and vegetables. Included protein, minerals and vitamins-all declined www.scribd.com

EU

- Recent figures show
- 49% of fruits, vegetables and cereals contain pesticide residues
- 10% of products contain four or more chemicals
- 5% of all fruits vegetables contain concentrations above legal levels

Selenium

- Article in Lancet - Margaret Rayman - July 2000 linked selenium depletion in European soils to:
  - [i] thyroid disorders
  - [ii] decreasing sperm motility
  - [iii] decreasing fertility
  - [iv] increased miscarriage rate
  - [v] increased cancer rates across the spectrum
  - [vi] mood disorders
  - [vii] increased risk of heart disease

Iodine

- Iodine deficiency in soil well known. Has now been linked to:
  - [i] thyroid disorders
  - [ii] fibrocystic breast disease
  - [iii] breast cancer
  - [iv] polycystic ovaries
  - [v] ovarian cancer
  - [vi] mental retardation/cretinism of the newborn
  - [vii] autistic spectrum disorders

As regards the latter-note the role of added bromine in the diet

What has happened?

- Addition of superphosphate
- Failure to replace lost nutrients
- Change of pH
- Loss of topsoil
- Loss of bio-system feedback
- Introduction of toxic chemicals
- Hybridisation of plants-allergenic
- GMO
- Monocultures

Further Reading

- Australian Organic Producer (quarterly magasine published by BFA)
- Australian Certified Organic (quarterly magasine published by BFA)
- Organic Advantage electronic magasine published by BFA
- www.bfa.com.au
- www.soilsystems.com.au

