

Chapter 5

Working with the Soil Food Web

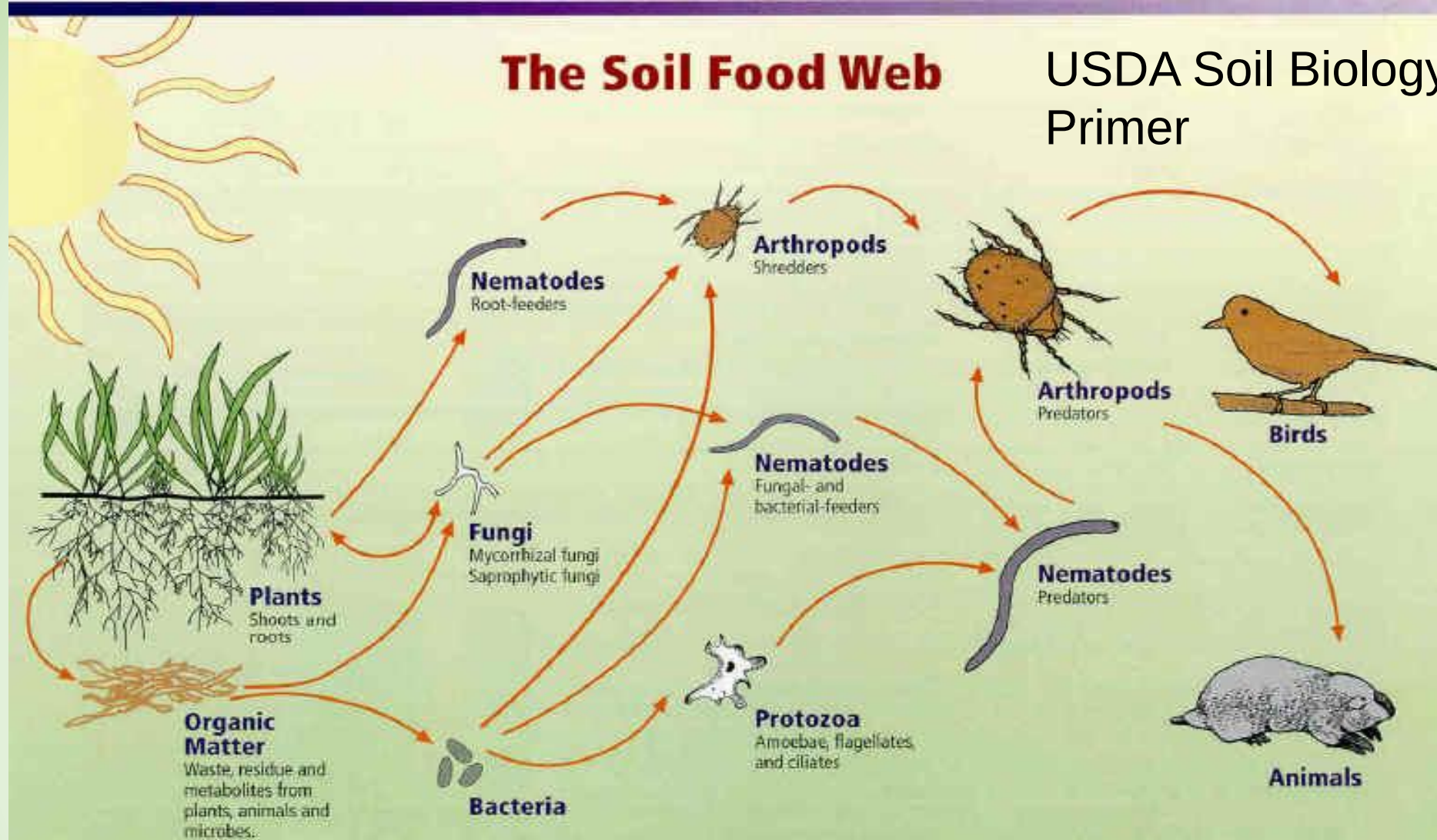
Lecture 25 - Case Studies
Camperdown Dairy Farms
Table Grapes in Australia

The Process of Conversion of Dirt to Soil

- Client Consultation: What is desired?
- Initial Site Assessment: What is present?
- Produce the Biological Plan: How to get the minimum levels of organisms back into the soil? Maintain them?
- Start applications of biology
- Check biology to make sure conversion is happening
- Apply any biology still lacking

The Soil Food Web

USDA Soil Biology Primer



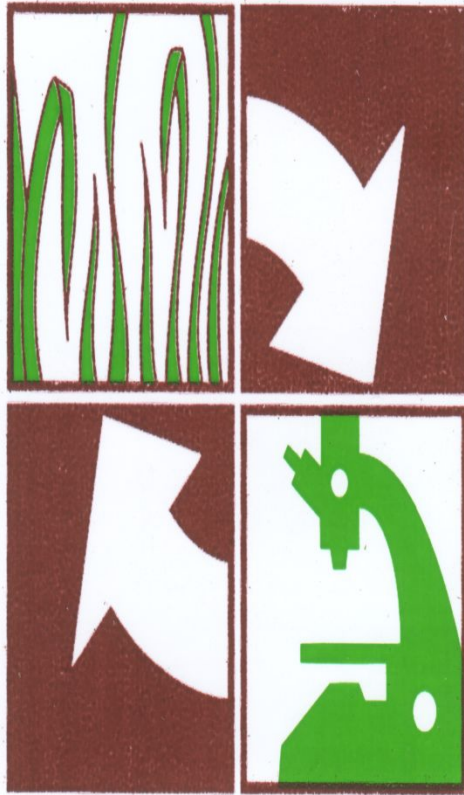
First trophic level:
Photosynthesizers

Second trophic level:
Decomposers
Mutualists
Pathogens, parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

Fifth and higher trophic levels:
Higher level predators



CAMPERDOWN COMPOST COMPANY

Biological Farming Products

Tony Evans and Nick Routson

Andrew and Linda Whiting's Farm



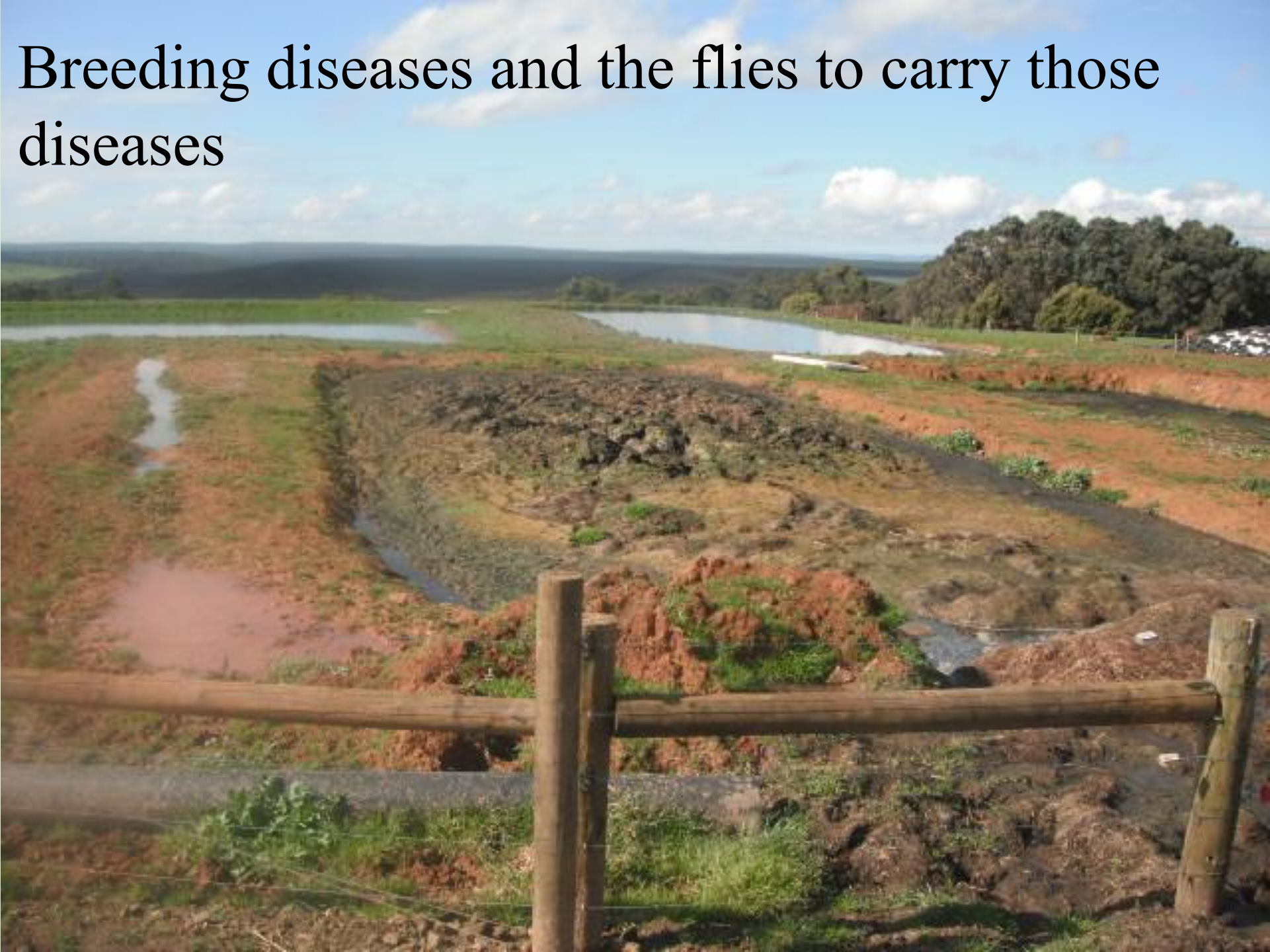
Dairy / Pasture Issues

- Fertilizer costs out of control but fertility not good enough
- Insect pressure on Lucerne; Insecticides used regularly
- Grass being pulled out by the roots, had to re-sow many paddocks each year (\$20,000/field)
- Clover long gone: no nitrogen fixation, dependence on chemical fertilizers
- Profit margins not good, animals sick, disillusioned with results of farming
- No waste management plan





Breeding diseases and the flies to carry those diseases





Compost Windrows



Making compost Graeme Clay 24/12/2010





Steps Taken to Fix Problems

- **BioComplete™ Compost Made On-Farm**
 - High N from the manure pits; Green from pasture/roadside weeds; Woody – chipped material from woodlots, old straw, shredded cardboard.
- **Check BioComplete™ Compost to make sure biology needed was present**
 - Made sure compost was as fungal as possible; protozoa and nematodes present
- **BioComplete™ Compost applied at 1.5 tons/ac**
 - 3 ton/HA in the fall/winter when rains started.
- **BioComplete™ Tea with fish hydrolysate applied three times early in the growing season**

Results

- Water infiltration increased immediately
- Soil profile maintained moisture all through the dry summer
- Weeds were replaced almost entirely by clover, forbs and better grass species.
- Bare patches gone. Insects insignificant. Some diseases in spring, applied BioComplete™ Tea again
- No need to re-sow paddocks,
- Cows did not rip roots out, roots at 3 to 4 inches initially, reached 4 to 6 feet in the first growing season



Andrew Whiting & clover 20/12/2010









**Nodules on
N-fixing
plants**



December (spring) 2010

The left side is the
neighbors farm;

Right side of fence is
the Whiting's farm.

Whiting's farm looked like neighbors farm 3 years ago.



Same paddock in April, 2011

Whiting's on left
Grazed 5 times

Neighbors on right
Grazed once

since the season started



May 2011

Whiting's: Grazed 7 times
times since season started

Neighbors grass
still not grazed



May 2011

No N has been applied since compost addition. Pasture is ready to be grazed ten days after last grazing



Results

- Deeper and larger root system; Cows not pulling grass out by roots
- Re-sowing costs decreased by 90% (\$20,000 reduced cost per field per year)
- Nitrogen use reduced by over half each year (dropped costs by \$100,000 in first year, \$50,000 more in second year, no N applications in this year). Saved growers over \$200,000/yr
- Converted wastes into benefit
- No disease or insect pressure
- Cow fertility improved significantly (need to validate)
- Stocking rate increased over last two years by 15%
- Mycorrhizal fungi increase from 4% to 87% in three years

Results

- Tissue tests balanced
- Farm different color
- No response to gibberellic acid or N fertilizer
- Much higher brix from 1-2 up now to 11-13
- No cockchafer damage, neighbors still do
- No red legs or Lucerne flea damage
- Clovers coming back
- Deeper roots
- Good growth in wet conditions
- Lots of worm activity and good numbers

Table Grapes in Australia



Case Study of Table Grapes Grown in Australia (2006 - present)

- For the last 35 to 40 years, Australia has been in drought
- Lack of water has severely reduced, and in many cases, devastated grape production in Australia
- Returning the proper biology (the workers to do the jobs) and organic matter (food to feed the microbes) to the soil, water-holding capacity can be increased by 2 to 10 - fold
- Reduce stress in the plants, increased yields
- No applications of pesticides or inorganic fertilizers reduced costs each year

Case Study of Table Grapes Grown in Australia (2006 - present)

Initial Site Assessment

- **Compaction:** At the soil surface >300 psi
- **Root Depth:** Roots only a few inches deep max
- **Water Infiltration:** 1 to 2 minutes, no structure in soil
- **Soil Biology:** Not-beneficial, bacteria only!
- **Soil Chemistry:** Ca:Mg 1:1, needed to be 5:1 (andesite clay); EC too high so salts were a problem
- **Weeds:** Patches of weeds, bare patches. Re-sow fields each 3 to 5 years.
- **Pesticide Applications:** Leafhoppers, Mites, Rhizoctonia, Fusarium
- **Fertilizer Use:** Manures, Inorganic fertilizers, Lime, Gypsum

Remedial Steps Taken

Spring time (before bud-swell)

- BioComplete™ Solid material, high in the missing soil organisms, was applied under the grapes.
- BioComplete™ Liquids, high in the missing soil organisms, were applied to the soil as a drench under the grapes.
- Mulch was applied under the grapes to protect from evaporation.

From bud-break to harvest

- Monthly applications of BioComplete™ Liquids applied if needed. Scouting was performed to determine exact application dates, and if applications were needed.

Results

Grape Exchange Australia (Table Grapes):

- **2006:** one non-productive farm achieved normal yields in 1 year
- **2007:** 34 farms converted; weathered severe drought, produced 75% normal yields (vs. 30-50% for conventional farms)
- **16% reduction in operating expenditure**
- **Improved fruit quality, 8% increase in marketable yields**
- **Reduced average water consumption by 50% to 70%**



**Sultanas grown on
Australian grape farm**

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