Advanced Compost

August 2015

"To forget how to dig in the earth and to tend the soil is to forget ourselves
Ghandi

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Building healthy soils

Healthy soil in Eltham will look different to healthy soil in Port Douglas.

Healthy soil in your front yard may well look different to healthy soil in your back yard.

Each soil has a different character: mineral content, soil structure, particle sizes, water retention abilities, colour and microbes, however, ***every soil has the potential to be improved.***

By understanding the principles of how to build soil health, you will be able to grow a more productive garden and you will become a better gardener!

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What do healthy soils have in common?

Huge variety of invertebrate and microbial life: it's alive!

Great nutrient retention

Good soil structure: small and large soil clumps (aggregates); lots of tiny tunnels and air spaces: the right 'porosity' for water retention and drainage.

Lots of visible organic matter: humus.

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The importance of soil…

Life on earth is sustained by complex underground ecological systems - soil food webs.

Many soil food webs have been disrupted by ill-advised farming and gardening methods.

We can return these soil food webs to health by restoring the soil biology.

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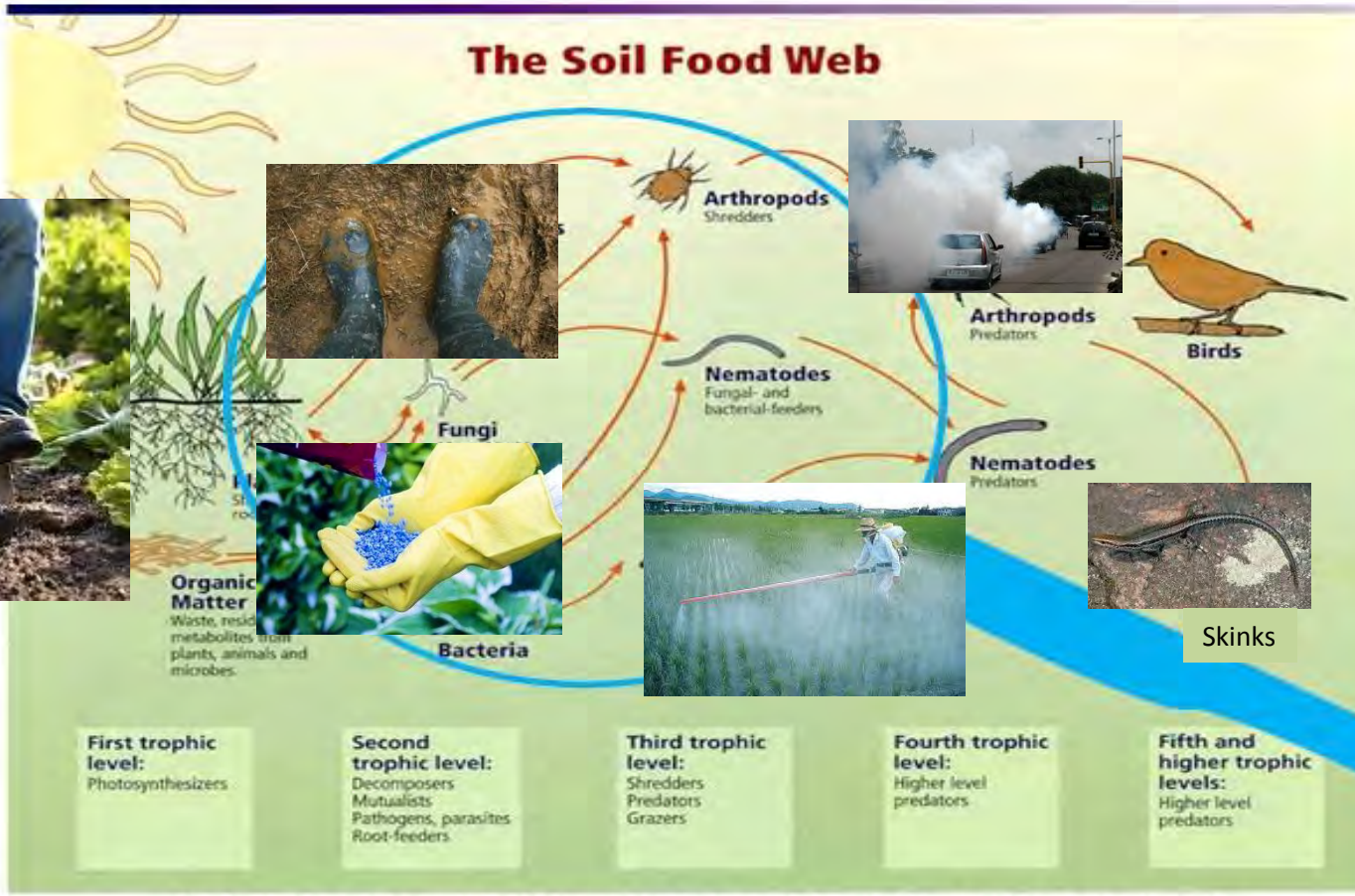

Relationships between soil food web, plants, organic matter, and birds and mammals
Image courtesy of USDA Natural Resources Conservation Service
http://soils.usda.gov/sqi/soil_quality/soil_biology/soil_food_web.html.

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Chemical solutions aggravate the problem.

Need to restore and enhance the soil biology.

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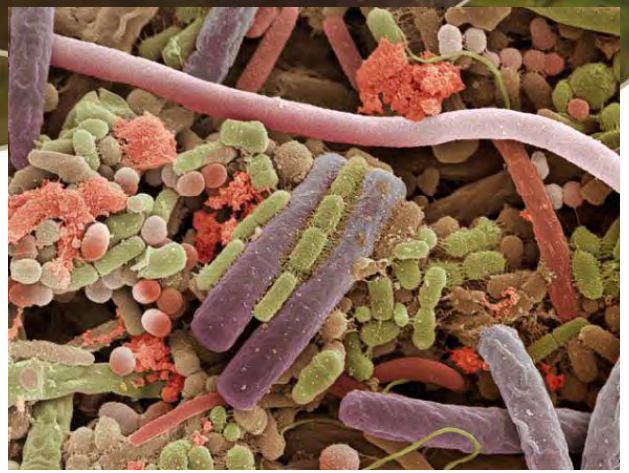

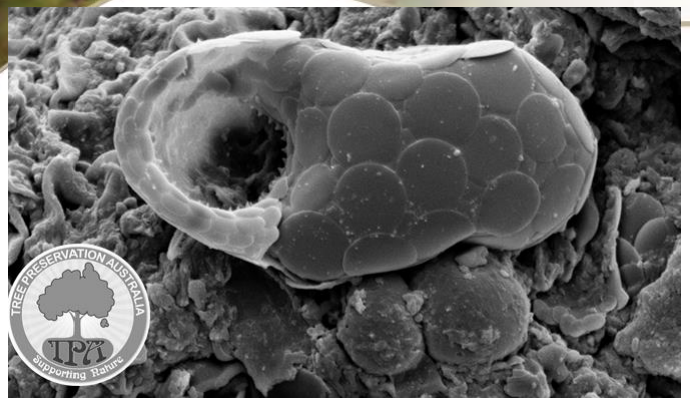

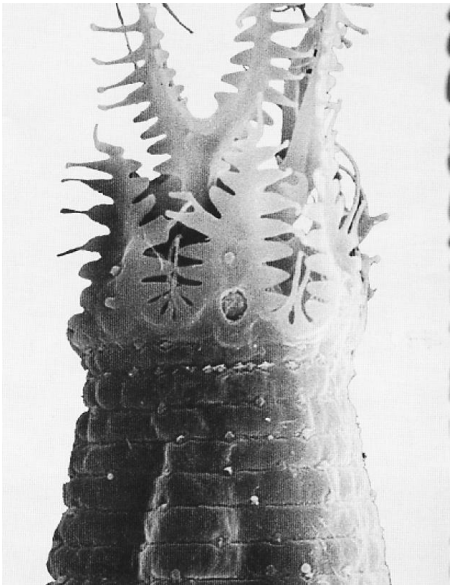

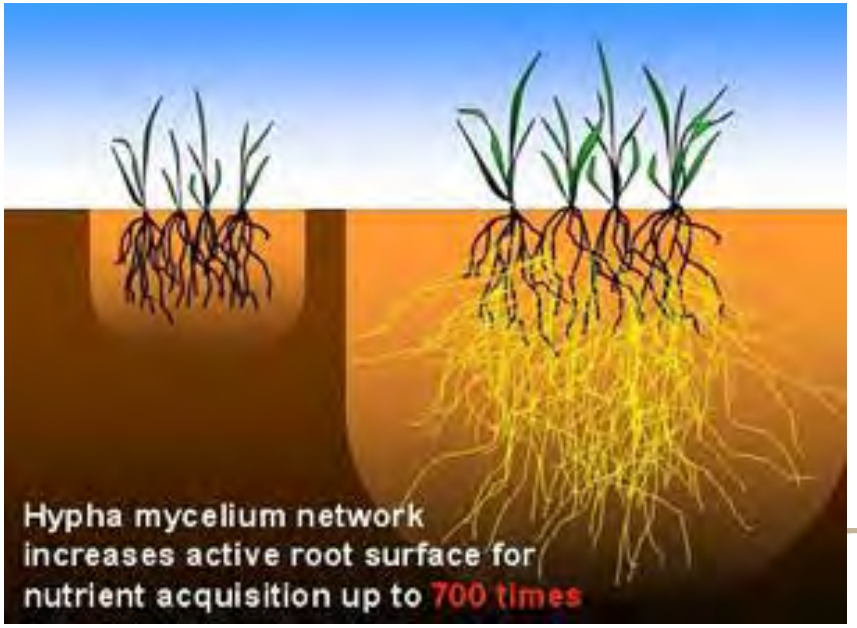

In your own backyard….

Building and maintaining healthy soils is essential for plant growth including the productivity of your veggie garden.

Main methods to achieve this for the home gardener are the production of organic matter in the form of compost and worm castings, as well as soil protection in the form of mulch.

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Compost is…..

The transformation of raw organic materials into biologically-stable, humus-rich substances suitable for growing plants.

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Why Compost?

Reduces waste to landfill!

Supplies nutrients and soil structure for your garden.

Stores carbon – the more compost rich your soil the more carbon it stores.

Compost added to the garden increases populations of bacteria, fungi and other microbes. These feed on compost and excrete nutrients readily available to plants.

Sticky secretions of these creatures bind soil together and improve its structure. Organic matter retains moisture and nutrients in the soil so they do not wash away readily.

Compost loosens soil particles allowing water and air to enter the soil structure and makes room for plant roots to grow.

Microbes attack and control disease causing pathogens.

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Composting methods vary and are dictated by cost, space and organic waste available to the maker.
Bins, bays and heaps are all options.
Reviews and recommendations are available on websites like :-
http://www.sgaonline.org.au/?p=6678

The five key elements of creating great compost

Size

Temperature

Oxygen

Moisture

Carbon / Nitrogen balance

Size

Ideal size is about 1 cubic metre.

Size of particles added also affects speed of decomposition so shredding or chopping materials is beneficial to a fast, hot compost.

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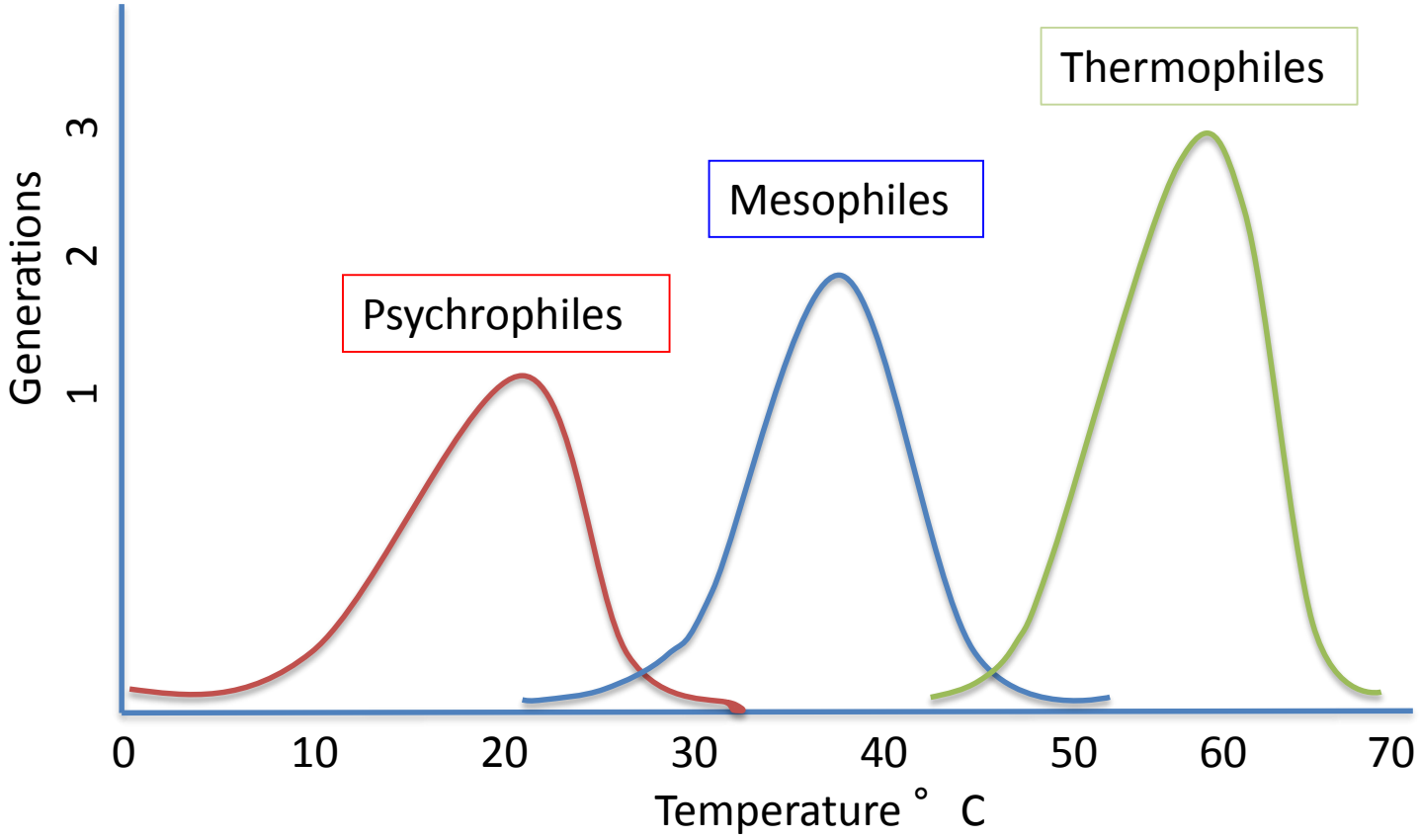
Temperature

Ideal location for creating compost is a sunny spot with some shade in the height of summer.

Microbial activity will raise the temperature of the compost between 40^{o}C - 60^{o}C.

Turning the compost accelerates the process as bacteria receive a boost from a fresh supply of oxygen.


Thermophiles
Mesophiles
Psychrophiles
Generations
1
2
3
0
10
20
30
40
50
60
70
Temperature ° C

Oxygen

Most beneficial microbes need oxygen to live and breed.

The more oxygen you get into your compost the faster it will break down.

Large piles need turning more often and are more difficult to manage.

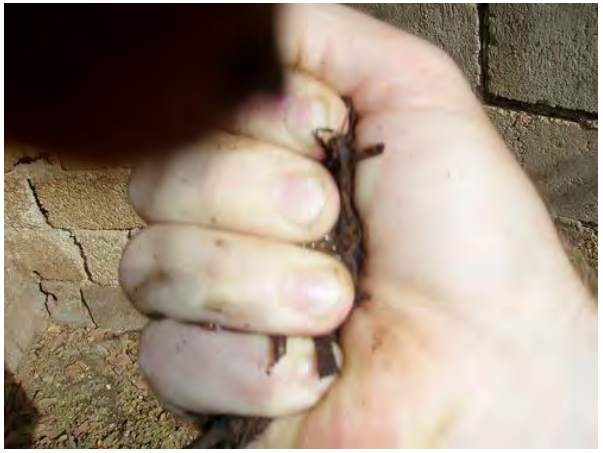
Moisture

The working compost should always be moist but not wet.

Microbes need water to survive. Ensure that your compost never dries out.

Water it when you water the garden.

Moisture content affects temperature. Drier compost mixtures heat up and cool off more quickly than wetter mixtures.



Carbon / Nitrogen balance
(C:N Ratio)

There is enough carbon in household waste to supply microbes with what they need but they also need nitrogen.

Nitrogen levels vary greatly in different materials.

Ideal carbon to nitrogen ratio is 25-30 parts carbon to 1 part nitrogen. 30:1

A bucket of kitchen scraps has a C:N ration of 15:1

A rule of thumb is to always add a few good handfuls of carbon rich material (like dried leaves or shredded paper) when adding nitrogen rich materials like kitchen scraps to your compost.

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Approximate C:N ratios of common composting materials

Chook litter	10:1
Kitchen scraps	15:1
Lawn clippings, weeds, shredded leafy branches	17:1
Animal manures (cow, sheep, horse)	20:1
Pea or Lucerne straw	30:1
Dead leaves	65:1
Wheat straw	75:1
Shredded paper	150:1
Sawdust and wood shavings	450:1

See handout for C:N balances

Creating compost

Choose method and infrastructure to suit your situation.

A ‘hands off’ approach (‘static’ or ‘cold composting’) will still ensure organic material eventually breaks down but it will be slow (12 months).

If you want to create compost more quickly (‘hot composting’) the conditions must be right.
The compost pile or bin can be created in one go from stockpiled materials and another bin begun while the first bin is maturing.

Using Compost

Compost is ready when it is has been maintained in its ideal conditions for between two to four months.

The mix will have reduced greatly in volume (up to one third of its original size) and will consist of coarse pieces of organic material which are no longer recognisable as the original contents.

The longer the compost is left, the finer the particles.

Spread or lightly dig compost through garden beds and mulch immediately to stop the sun killing off the life in your newly inoculated soil.

Ratio of bacteria to fungi is different for different plant communities.

Bacteria-dominated in early succession communities (bare earth, weeds, vegetables).

Fungal-dominated in late succession communities (shrubs, trees, old growth). Equal balance of bacteria and fungi for most row crops and garden flowers.

Bacteria/fungal ratio can be changed to favour different kinds of plants.

Bacteria favour higher Nitrogen compost. Fungi favour higher carbon compost.

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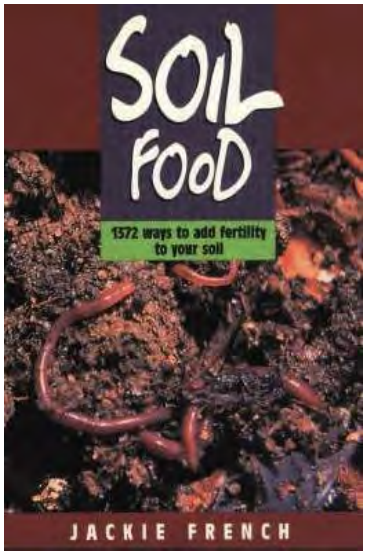
Soil biological succession drives plant succession

	Bacteria …..	A few Fungi…	Balanced….	More Fungi…	High Fungi
Bacteria:	10 µg	100 µg 500	600 µg	500 µg	700 µg
Fungi:	0 µg	10 µg 250	600 µg	800 µg	7000 µg

- Compost extract
- Actively aerated compost tea http://permaculturenews.org/2012/07/11/compost-teas-and-extracts-brewin-and-bubblin-basics/
- Quick fixes: liquid manures; foliar sprays; teas; tonics



Any Soluble Fertiliser
Apply in small doses, only on growing plants where the nutrients can be taken immediately and converted into plant material. Not on bare soil.

Blood and Bone
Scatter on the garden like icing sugar on a cake, once a fortnight.

Pelletised Hen Manure
A scatter once a fortnight should be enough – again in small doses, only on growing plants where the nutrients can be taken immediately and converted into plants. Not on bare soil.