

Composting to Healthy Soil

This is the descriptive version of the composting workshop we provide from Polyculture worm farm. If you have any questions please contact us.

WELCOME

HAVE A PURPOSE IN LIFE!

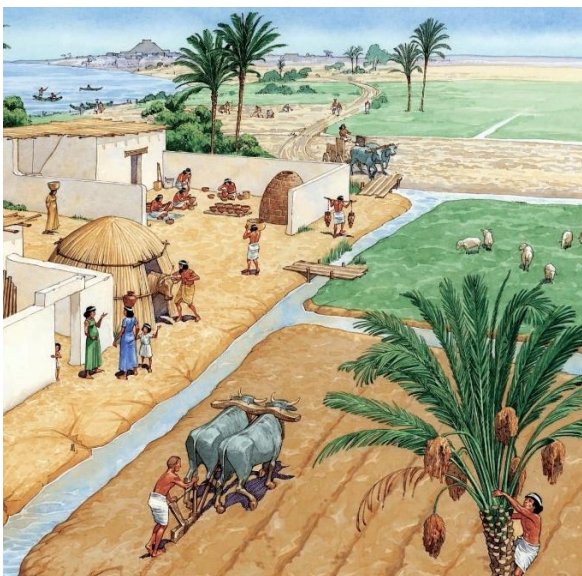
Nature has taught me that real knowledge begins when we allow the truth to change the way we think.

HISTORY OF COMPOST

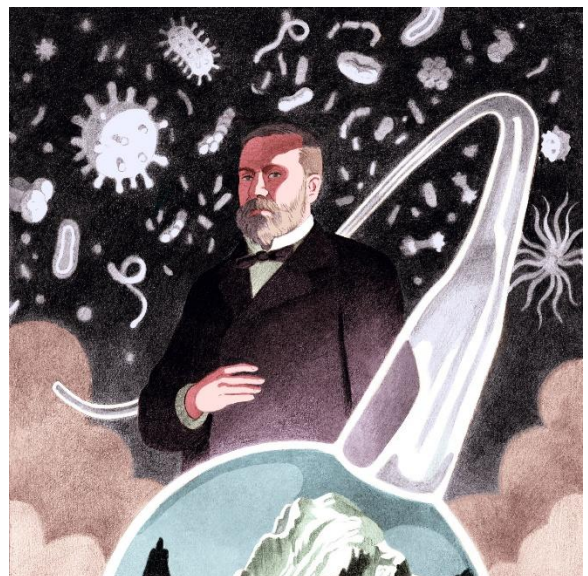
Records show compost being used throughout Asia 4000 years ago and in Babylon in 1800BC.

Thomas Jefferson realised crops produced higher yields each year when compost was added to the soil.

In 1856, Louis Pasteur, armed with a microscope, discovered that certain bacteria caused beer to go sour and often caused severe illness in consumers, and the right microbes made good beer!



Village Composting



Louis Pasteur

EARTH WORMS

There are 6000 species made up into 20 families worldwide; we have 8 of those families in Australia. Global research continues into these amazing creatures, so species and families will continue growing.

<https://australian.museum/learn/animals/worms/australian-earthworms/>

COMPOST WORMS

Eisenia fetida, *Lumbricus rubellus*, *Eisenia andrei*, are all mulch dwellers staying in the top few centimetres of top soil. Larger earth worms go deeper into the soil profile. All worms are underrated.



Composting worms



Breeding worms

Vermicompost Research:

<https://link.springer.com/article/10.1007/s43621-024-00245-y>

<https://www.researchgate.net/topic/Vermicomposting/publications>

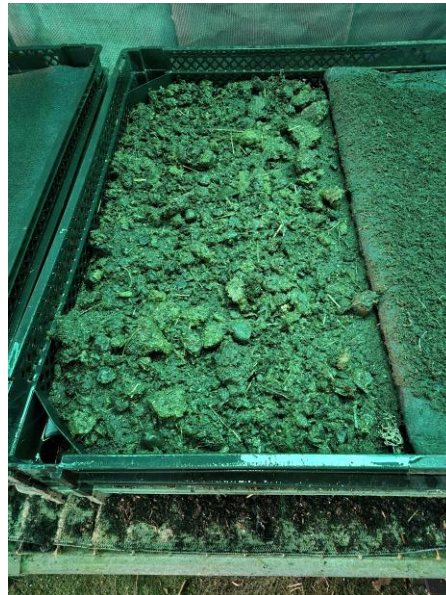
FEEDING WORMS

Keep it light and more frequent, always wet the feed in, keep the brown and green equal or more brown is better. Worms consume about 30% of

their weight in a day during summer and less in the colder months.
1000 worms = 250 grams, approximately.



Before feed



After feed

The key to successful worm farming is to not overfeed while keeping the bedding moist and covered in the dark!

The Worm Farm page has multiple documents you can download for more detailed information.

<https://polyculture.com.au/worms/>

MOISTURE - pH

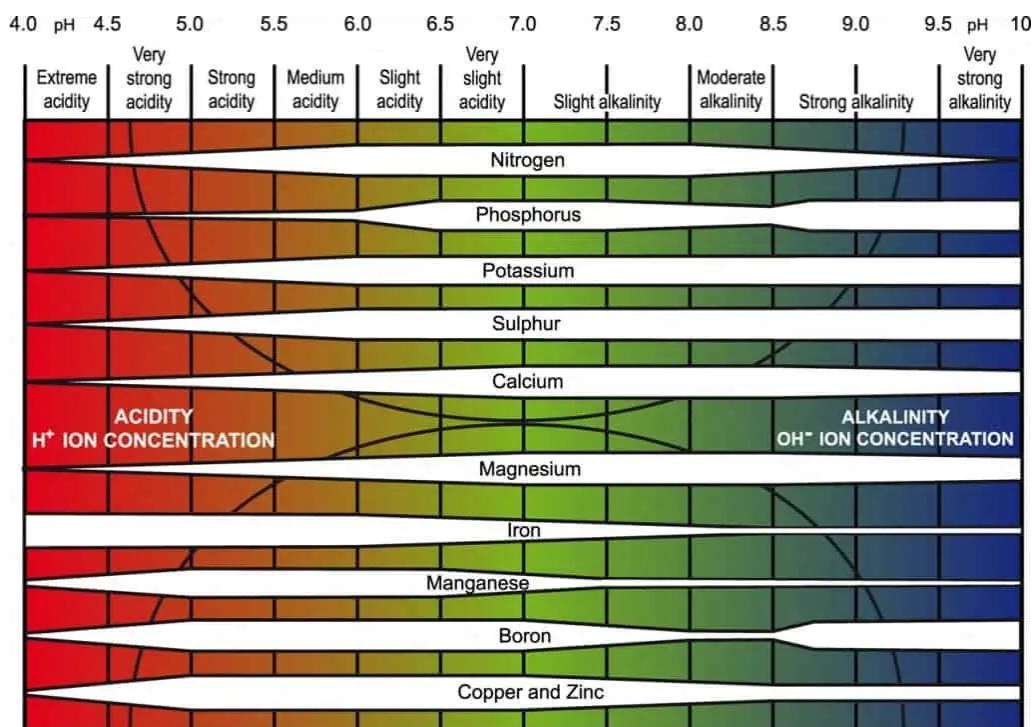
Worms and microbes need about 75% consistent moisture.

Keeping cover mats moist also regulates the bedding temperature. Up to 80% moisture is far better than 50%. Consistent moisture helps worms and microbes with their movement, feeding and breeding. Ideally, when you squeeze the bedding, you will feel the water pushing out between your fingers. Th moisture also helps balance pH. Managing pH is not a major task in any type of composting as long as the brown and green materials are balanced. Too much green increases the nitrogen which will push pH out of balance and can also start to heat up.

We do not recommend using town water, as it contains chemicals designed to kill bacteria, which over time will have a detrimental effect on the microbe population in your worm farm. Remembering that microbes are the real worm food! Positioning your worm farm out of direct sunlight is good for many reasons including, temperature, smell and moisture.



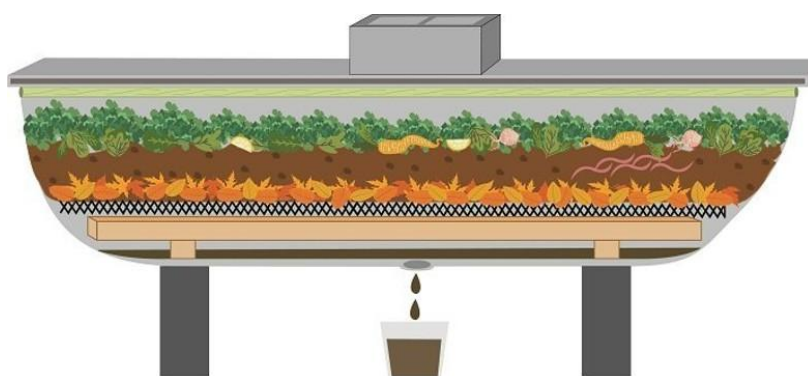
Worm farm moisture & Ph test



pH scale – 6.8 – 7.5 high mineral availability

LEACHATE

The liquid draining out the bottom of a worm farm has no microbes, only some minerals, you need both for healthy soil and plants. We reuse that leachate to pour over the cover mats to maintain moisture. You can learn how easy it is to make your own worm extract liquid (WEL) from worm castings. Download the “How to use” document from the [worm farm page](#) and watch the educational videos on [The Soil School](#)



WORM CASTINGS

One research project showed worm castings improved tomato yield by 74% while increasing vitamin C content by 47% and soluble sugar by 71%. Now that is a healthy pest and disease resistant plant!

There really is nothing else like high-quality worm castings! Full of beneficial microbes, minerals and carbon, all in balance. It takes time to make really good castings, so be patient when you start. Don't try and take the first load before 6 months of aging. After that you should have the same amount every couple of months. The castings should look and feel like dark coloured mud!



Well-aged castings



WEL Concentrate



Add kitchen scraps

You can make worm extract liquid (WEL) and dilute in water for the absolute best coverage. The link below has many downloads including “how to use worm castings”. <https://polyculture.com.au/soil-services/>

There is more research on the benefits of worm farming in this link:

<https://projects.sare.org/project-reports/ow20-357/>

WORM FARM VISITORS

PESTS:

Bandicoots cannot climb so we do not recommend worm farms on the ground. **Crickets** are another worm loving carnivore which will leave channels in the bedding that makes them easier to find. Catch them then feed them to the chooks! **Ants** will nest in the bedding and destroy your worm population and feed. Avoid this silent hidden invertebrate by placing legs of the worm farm in water containers. **Rats** will eat anything so figure out how to protect your worms and keep a weight on the lid of stackable home worm farms! Australian native bush rats are carnivores, so the same protection for compost worms apply.



Bandicoots



Cricket

BENEFICIALS:

Springtails are a sign of a healthy ecosystem and a worm farm will become its own micro-ecosystem. They do the same job as worms, so leave them to it!



Different Springtails

We see quite a few **spiders** in our farm, mostly huntsmen hanging around our trays. It appears they keep the cockroaches under control. The other major worm farm friends are **pythons** who manage rodents better than any traps or poisons ever will. They sleep most of the day and only occasionally get in the way. Try not to handle them too often as they are good at letting you know when the “do not disturb” sign is hidden!

<https://research-repository.griffith.edu.au/items/e8057d9f-49bf-4fa2-943e-4abd3682b86f>

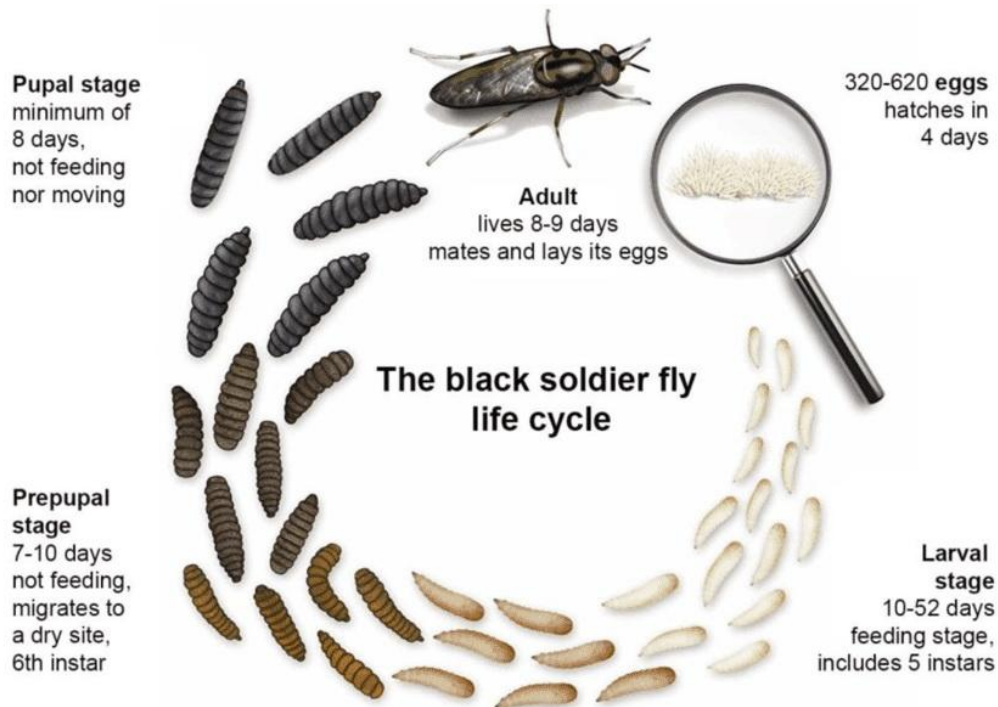
TUMBLER

Keep green and brown equal + moisture rotating at least every second day, every day is ok. Adding worm castings speeds up decomposition because of microbes. Check out the videos [@thesoilschool](#) for updates.



BSF

Black Solider Fly are active in summer months in SEQ, have no mouth, live for about 8 days to breed. The larvae create an anerobic (low oxygen) sludge that has all minerals but should only go into compost to be further decomposed by beneficial microbes. The larvae are also about 40% protein which is very good poultry feed. Harvest and freeze during the warmer months for winter poultry food.



WEEDS

A black plastic bag will store enough heat to sterilise seeds so they don't sprout. All you need is enough green materials and moisture to maintain at least 55 degree C for 72 hours. Managing weeds in the soil is quite simple, they are sign posts. It is highly likely the "dirt" has little or no available calcium and phosphorous and low in carbon, oxygen and hydrogen. If you reverse these issues, the weed seeds will not sprout.

Download the [Soil References file](#), scroll down to the biological weed control for more details.

MONITORING

It is important to monitor your worm farm and any compost!

You don't want any "bad smells", that normally means something is rotten and has attracted anerobic bacteria which release elements that attract house flies, rats and many other pests. The bedding should always smell earthy when you lift the moist cover mat. Checking the worm farm every few days will help you take care of any issues before they become problems!

MICROBES & FUNGI

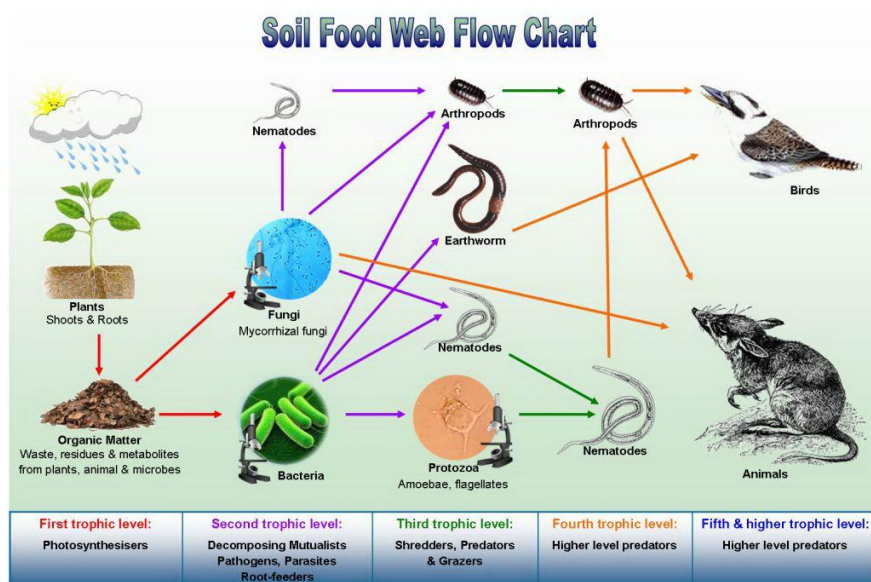
Bacteria, fungi, protozoa, nematodes, arthropods, invertebrates and parasites all need to be in balance. Beneficial microbes' breakdown & consume pathogens that can kill humans like E-coli and Salmonella. Beneficial fungi feed plants, store carbon, water and can greatly increase plants nutrient uptake. If you would like to learn more about these wonderful free resources from nature, check out the links below. We hope it helps you realise how important it is to maintain soil health and structure. Beneficial fungal spores survive through all types of composting. There are also a few fascinating books in the [Soil references](#) file.

<https://www.nature.com/articles/s41467-025-64139-x>

<https://www.youtube.com/@soil-microbe>

<https://www.sciencedirect.com/science/article/pii/S001670612200074X#f0020>

When we selectively take parts of a system out, there are always consequences! The flow chart below displays how a simple eco-system functions, that is nature, all the parts that make up a whole are always needed. Composting is nature within some type of confinement, so you have to be prepared to be a part of that system. Nothing is free and nothing lasts forever.



All are needed in balance

BOOSTER

The Booster helps you manage pH while adding long term microbe food in the form of soluble minerals, all in balance for excellent worm health. The mineralised grit also helps the worms process their food faster.

Other wonderful outcomes from the booster are that it increases microbe diversity and activity, while raising that population by over 35%. You can feed booster into your garden beds, trees and your lawn a couple of times a year for healthy soil, boosting all plants immunity to pests and disease. More information is available at this link.

<https://polyculture.com.au/soil-worm-farm-booster/>

CARBON : NITROGEN RATIO

If a compost pile is greater than 1 cubic metre, it is possible for it to start fermenting into alcohol and self-combust under the right conditions. If hot composting is what you want, you need 60% wood, 30% green and at least 10% high nitrogen. Moisture levels must be maintained just right and turn the middle of the pile out after 72 hours at 55C. Please contact us for more details on this potentially dangerous process! Thermophilic (HOT) composting is a delicate system that needs constant monitoring. Hotter temperatures require more frequent turning. Please ask for details!

This is why we prefer to use mixed mulch piles for burying kitchen scraps and manure while adding WEL.

The Carbon to Nitrogen (C:N) is your balance point. The C:N Ratio needs to be at least 16:1 as a start for microbial activity in your soil, working towards 30:1. Hot compost is a completely different story, so finding that balance point from compost to your soil is calculated in the C favour!

Why do you think plants grow out of wood mulch piles? CARBON!

As the sand, silt, and clay particles fall out of the plant materials during decomposition it starts to create a “soil” type profile. Those particles are there because of the winds that have carried them from who knows where. Extra carbon will not slow down seed sprout or plant growth! And that mulch will always help if used as a soil rebuilding – weed suppressant tool on top of any soil.

You can download the C:N materials guideline from [The Soil School](#) page.

FUNGI : BACTERIA RATIO

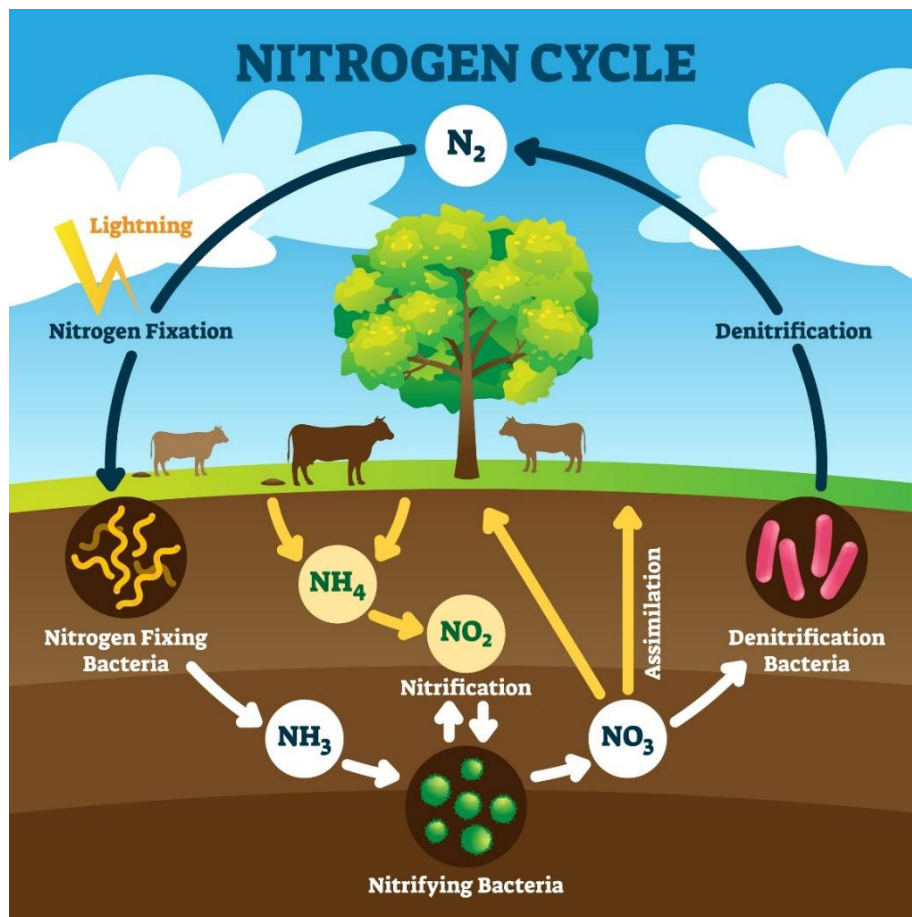
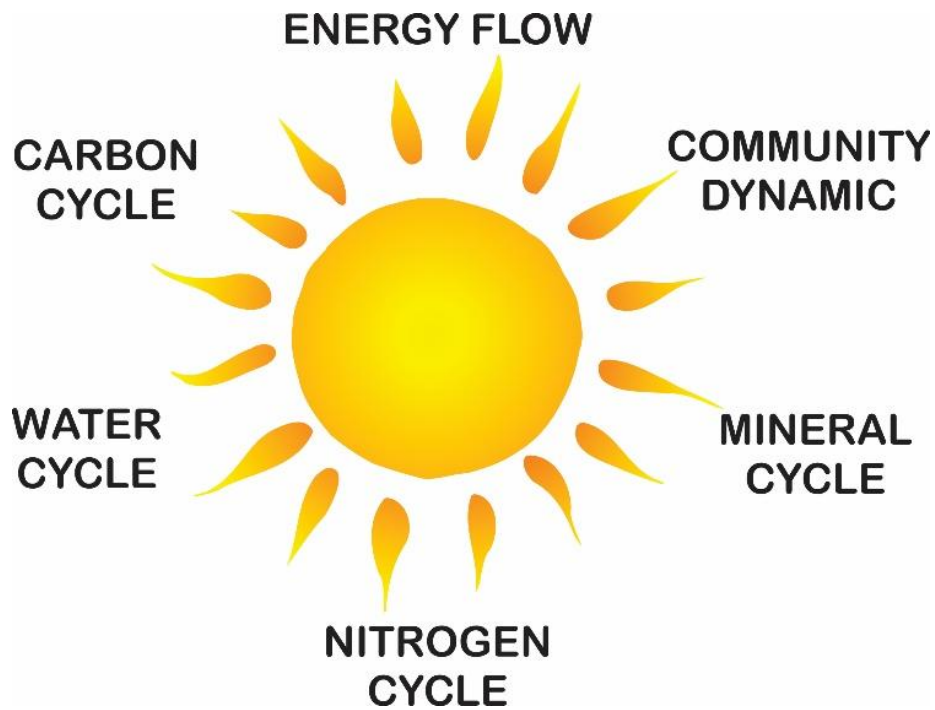
The F:B ratio will balance itself out based on the plants that are growing in the soil and the type of mulch on top of the soil. Beneficial **Endophytic** fungal spore help plants grow, and will sprout when plant roots are growing and releasing exudates. That “message” from the plant tells the fungal spore it has a home to attach to! **Saprophytic** fungi decompose organic matter in unison with bacteria, termites and other micro-arthropods. Once again, the same principal applies in decomposition where the fungi and bacteria balance themselves out because of the type of organic matter present.

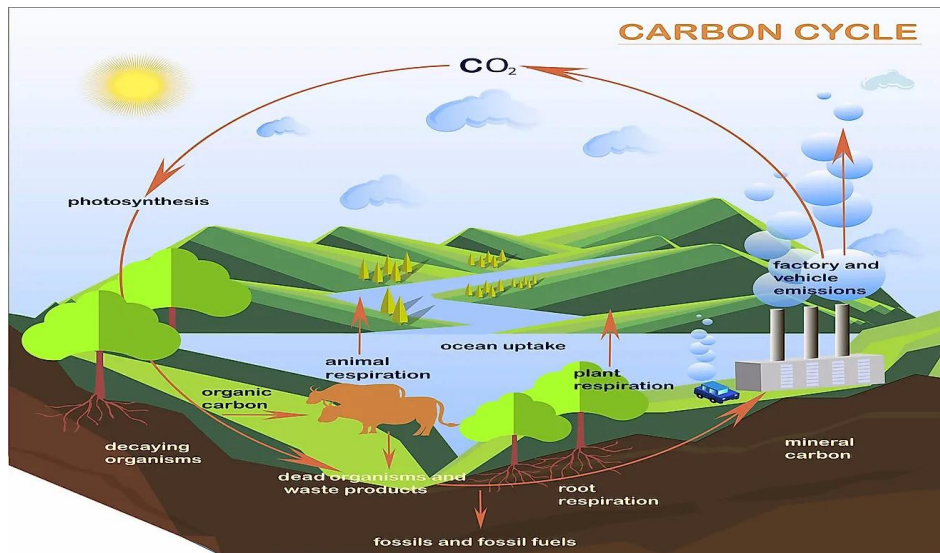
<https://nph.onlinelibrary.wiley.com/doi/10.1111/nph.20219>

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10146397/>

NATURAL CYCLES

Greenhouse gases are forced in and out of healthy soil and compost because of weather systems e.g. High-and low-pressure systems! Plants are the energy highways for the natural cycles during photosynthesis.



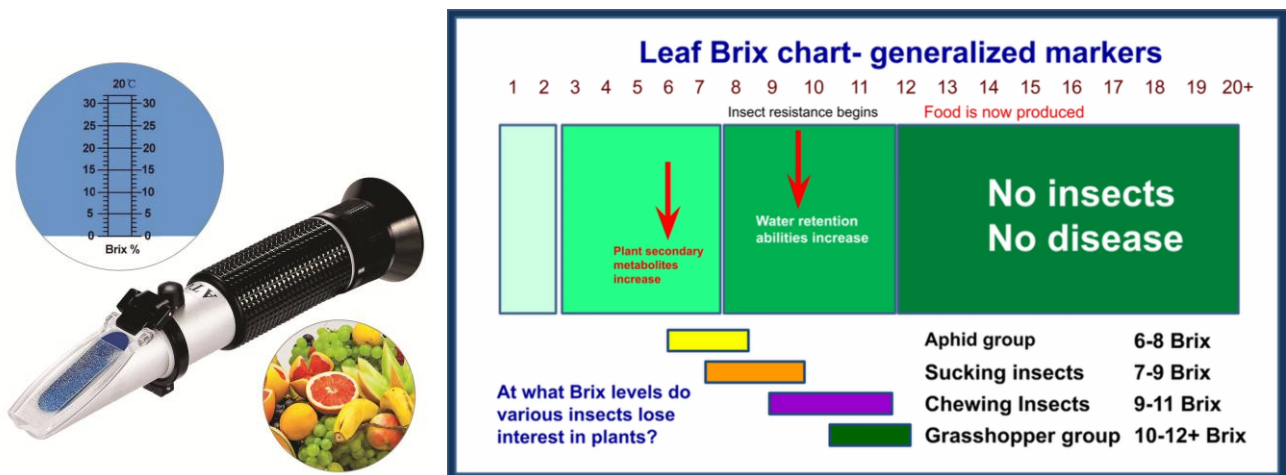


The Water cycle is the catalyst for all cycles

MOISTURE IS YOUR MICROBE'S BEST FRIEND!

BUILDING HELATHY SOIL

When we focus on feeding the soil for healthy plant growth, how do we know when the plant is healthy? We use a Refractometer, Brix meter.



This wonderful tool can tell us so much about soil health, mineral availability, soluble sugars and how resistant the plant is to pests and disease. In the chart above (developed by Dr Thomas Dykstra), you can see how the higher brix reading offers pest resistance which means the sugars are flowing through the energy highways. As a guide, check the brix readings of plant sap early afternoon.

The key message from the meter is whether you have available calcium, the king all minerals! That should be a fuzzy line between blue and white. A clean straight line is no calcium available, that's when it's time to find out why! High soluble sugars in plants means that the microbes in the soil are being fed and return delivering nutrients to the plant roots.

All suppliers seem to be about the same price, so here are a couple to choose from.

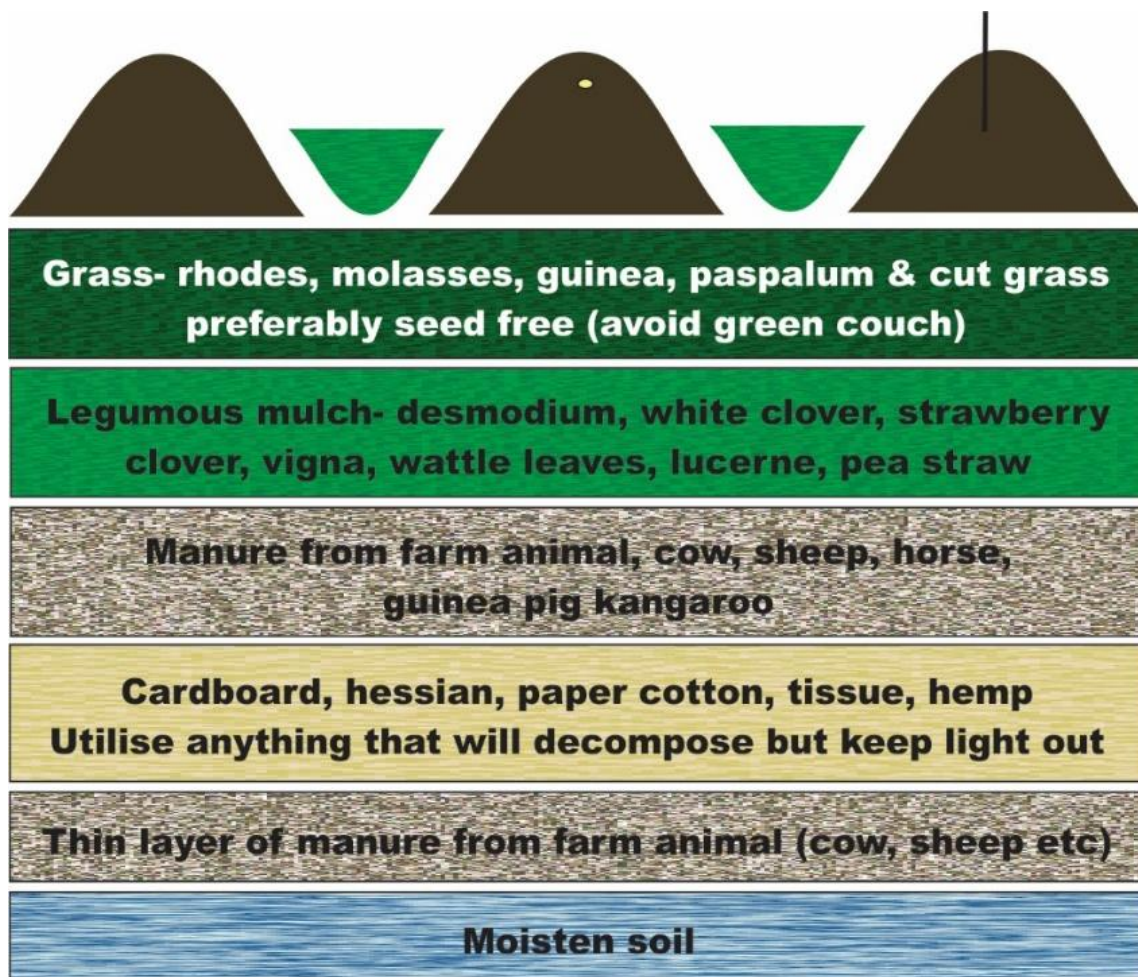
<https://www.themeterman.com.au/>

<https://biostim.com.au/shop/brix-meter/>

By all means shop around, you shouldn't need any special sap extraction tool for healthy grass, fruit or veg. If you find a stubborn plant use pliers to extract the sap instead of a garlic press.

For No dig garden guide. Check out the videos [@thesoilschool](#) for more details. There is also a pdf file you can download from our website, scroll down until you see the link [No Dig Garden](#)

Any comparable carbon – brown materials can be interchanged. We use compost above manures and add worm extract liquid to every layer to kickstart decomposition. Adding booster to the top green layer before adding appropriate mulch (normally grass-straw) will help microbial activity once plants are added. You can also set the underlayers in vertical sections to suit the type of plants in the bed, e.g. wood mulch for hard trunks, grass mulch for soft green trunks and stems.



No Dig Garden Guideline

As you can see above, there are plenty of options to build your own soil. Keep topping up with an appropriate mulch as required, that suits the plants you are growing. You mix your mulch types together when growing different species and stem types e.g. coriander under a rosemary bush!

As you can see from all above, there are many opportunities to reduce kitchen waste going to land fill. We are sure you will find multiple methods of composting that can fit into your lifestyle, from which you can grow healthy biologically active soil. From that soil your plants will remain vibrant and healthy for many years to come.

WHY BOTHER - HELP EACH OTHER!

We need to rebuild and conserve our top soil far better than we have in the past. What they “sell” us determines how we operate. What we really need to do is judge their sales pitch against natural alternatives, then decide what gives us the biggest bang for our \$\$\$\$. When we take the time to compare both methods, helping the natural systems will always give us superior outcomes (proven by [The Rodale Institute](#)) than any chemical or mechanical process.

Download our online documents for more info, guidelines and research. Share the knowledge you gain to improve your environment, family - community and future. Composting is the start of a healthy future!

We will keep posting educational videos and answer questions whenever required [@thesoilschool](#)

The Robinson Family

