Advanced Home Composting and Worm Farming

Presenter: Ellen Regos

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Cultivating Community

We envision joyful, connected communities who care for each other and our earth.

Our purpose is to inspire a healthy and just world by providing nourishing and informative food and gardening experiences.

We work with diverse and low-income communities in Victoria to create a fair, secure and resilient food systems by improving access to healthy, affordable and culturally appropriate food.

Our three program areas are:

I. Food Systems
II. Public Housing Community Gardens
III. School Food Gardens Program

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Webinar outline

- Food waste in Australia
- Why recycle food waste at home?
- Food waste recycling options
- Troubleshooting
- Questions

https://www.aboriginalvictoria.vic.gov.au/fact-sheet-aboriginal-coastal-shell-middens

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The Global Picture

#4

Australia ranks as the 4th highest food waster in the world (per capita)

298KG

*Australia throws away a colossal 298kg per person each year**

1/3

of food produced globally is wasted

Sources

Food Sustainability Index (2018) | National Geographic
**298kg per person across the food supply & consumption chain*
https://www.environment.gov.au/minister/price/media-releases/mr20190320.html

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'Supervalue' - a look at food miles and food waste

https://www.youtube.com/watch?v=kjfYu0H49rM

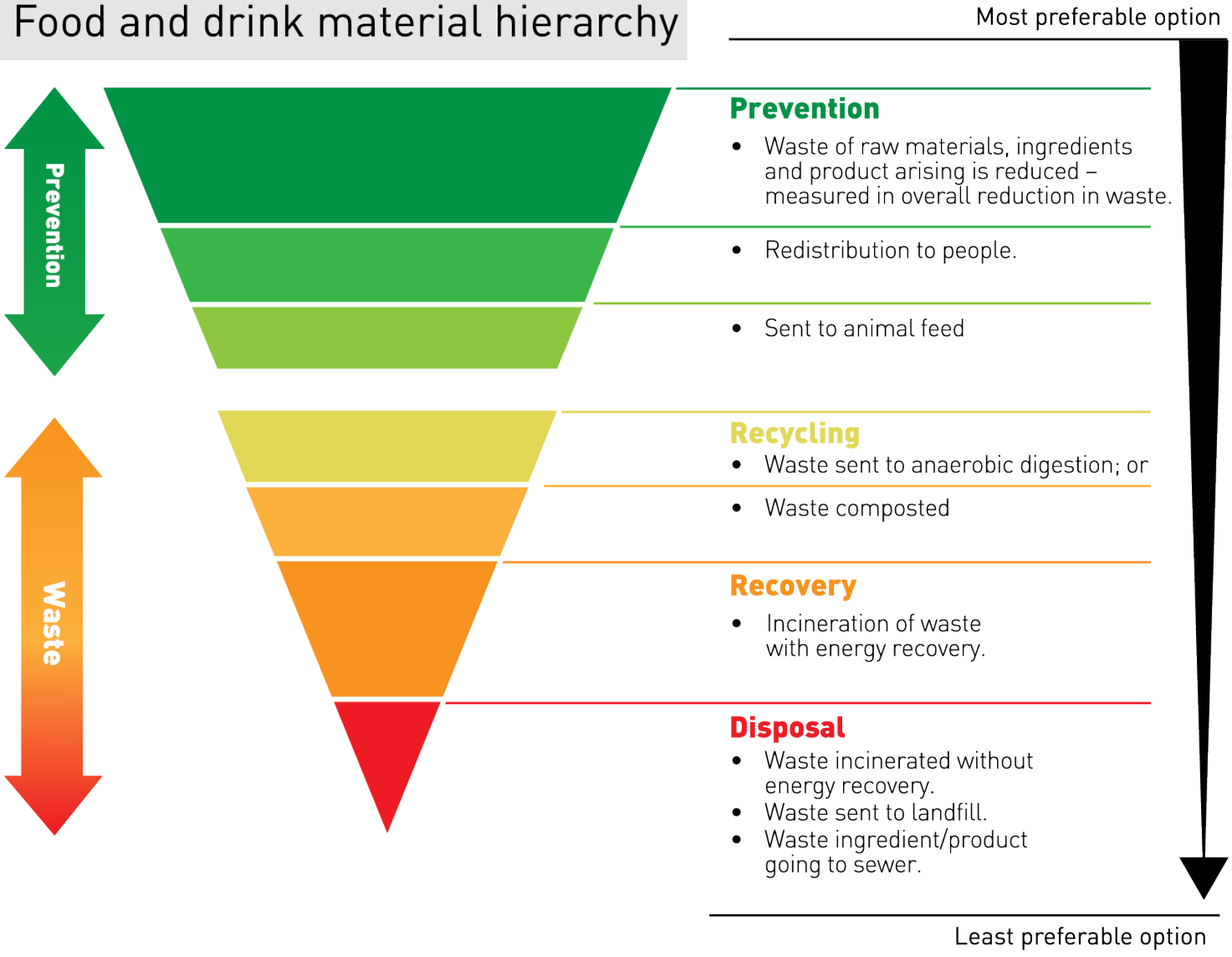
Why compost at home?

Personal motivation to recycle food waste

A-Z of food waste recycling

Advanced webinar
Build your soil from food waste
Connect with other people
Discover the differences in systems
Examine products and tools to help
Feel confident recycling organics
Garden waste and how to compost it
Hold a worm (I wish!)
Issues that may come up
Join a growing movement
Know which system to choose & why
Learn about decomposition
Make small changes for big impact
New information about ‘how to’
Observe and respond to your system
Practical solutions to issues
Questions answered
Reduce your eco-footprint
Recycle organic waste at home
Share your waste
Troubleshoot problems
Understand where food waste goes
Vermicast, vermicomposting
Worms are cool!
Xeric compost bins
Year cycle of your system
Zero food waste to landfill

Food and drink material hierarchy



"THERE IS NO SUCH THING AS 'AWAY'. WHEN WE THROW ANYTHING AWAY IT MUST GO SOMEWHERE."

Annie Leonard

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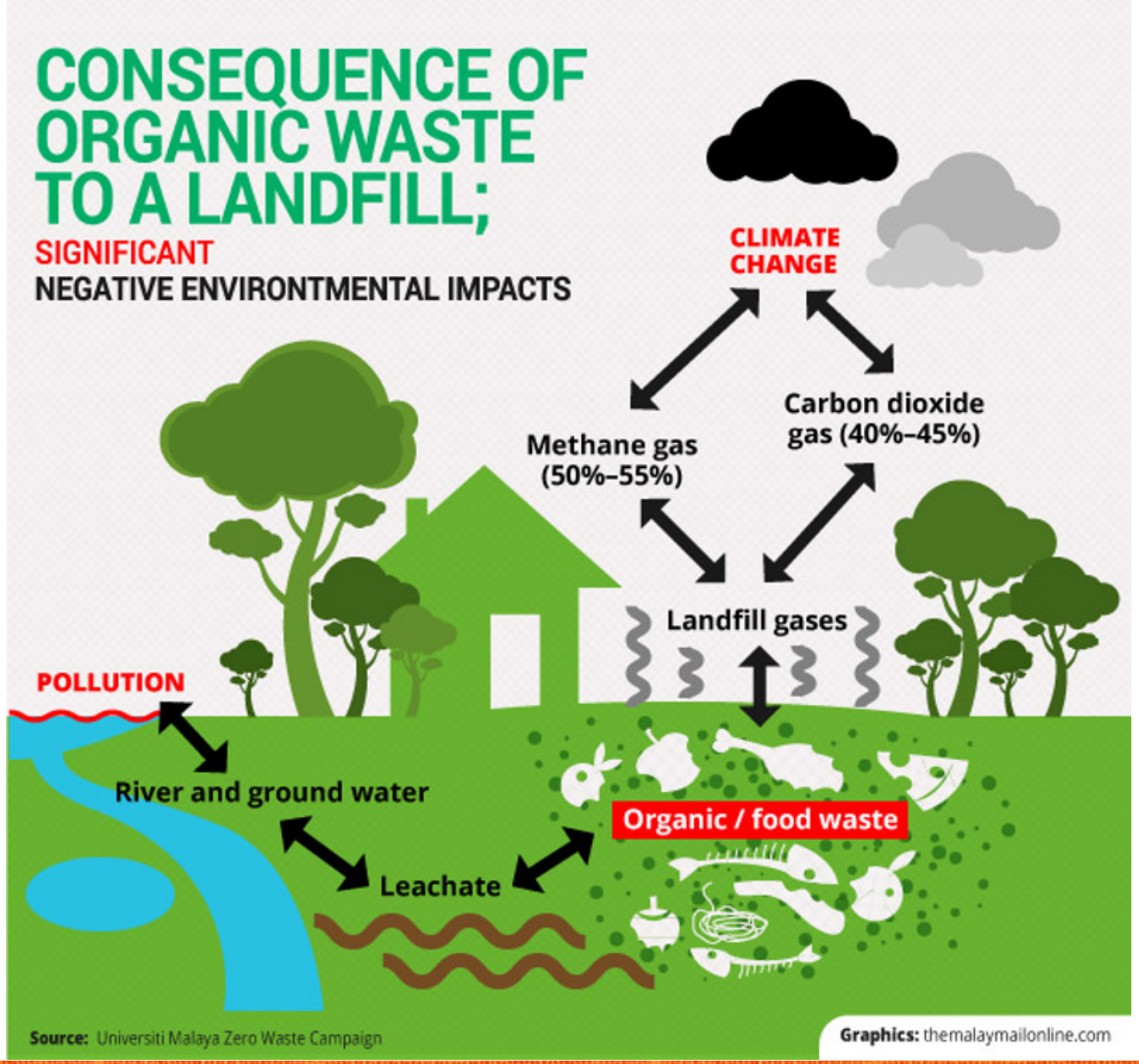
Why recycle our food waste?

- Reduces waste to landfill by up to 50%
- Remarkably easy to do
- Once a system is set up the cost is low
- Provides valuable nutrients for the garden


CONSEQUENCE OF ORGANIC WASTE TO A LANDFILL;
SIGNIFICANT
NEGATIVE ENVIRONTMENTAL IMPACTS
CLIMATE CHANGE
Carbon dioxide gas (40%–45%)
Methane gas (50%–55%)
Landfill gases
POLLUTION
River and ground water
Organic / food waste
Leachate
Source: Universiti Malaya Zero Waste Campaign
Graphics: themalaymailonline.com

The science

Aerobic decomposition – with air
Anaerobic decomposition – without air

Food waste is high in minerals and water

Water

Heat

Gas

Microorganisms such as bacteria, fungi and microbes assist food waste to decompose

Macro-organisms such as earthworms

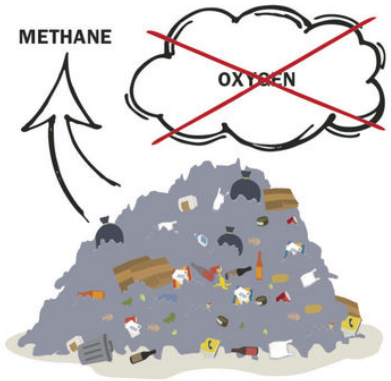
What is methane?

HOW FOOD WASTE BREAKS DOWN

In a landfill versus composting

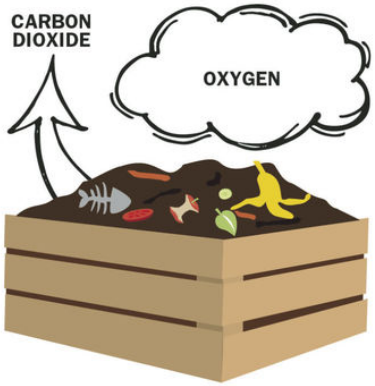
LANDFILL

When food waste is thrown out in the trash it heads to the landfill. It gets buried and does not have access to oxygen — it undergoes anaerobic decomposition. Because of that the organic materials release methane gas, which is much more potent than carbon dioxide.



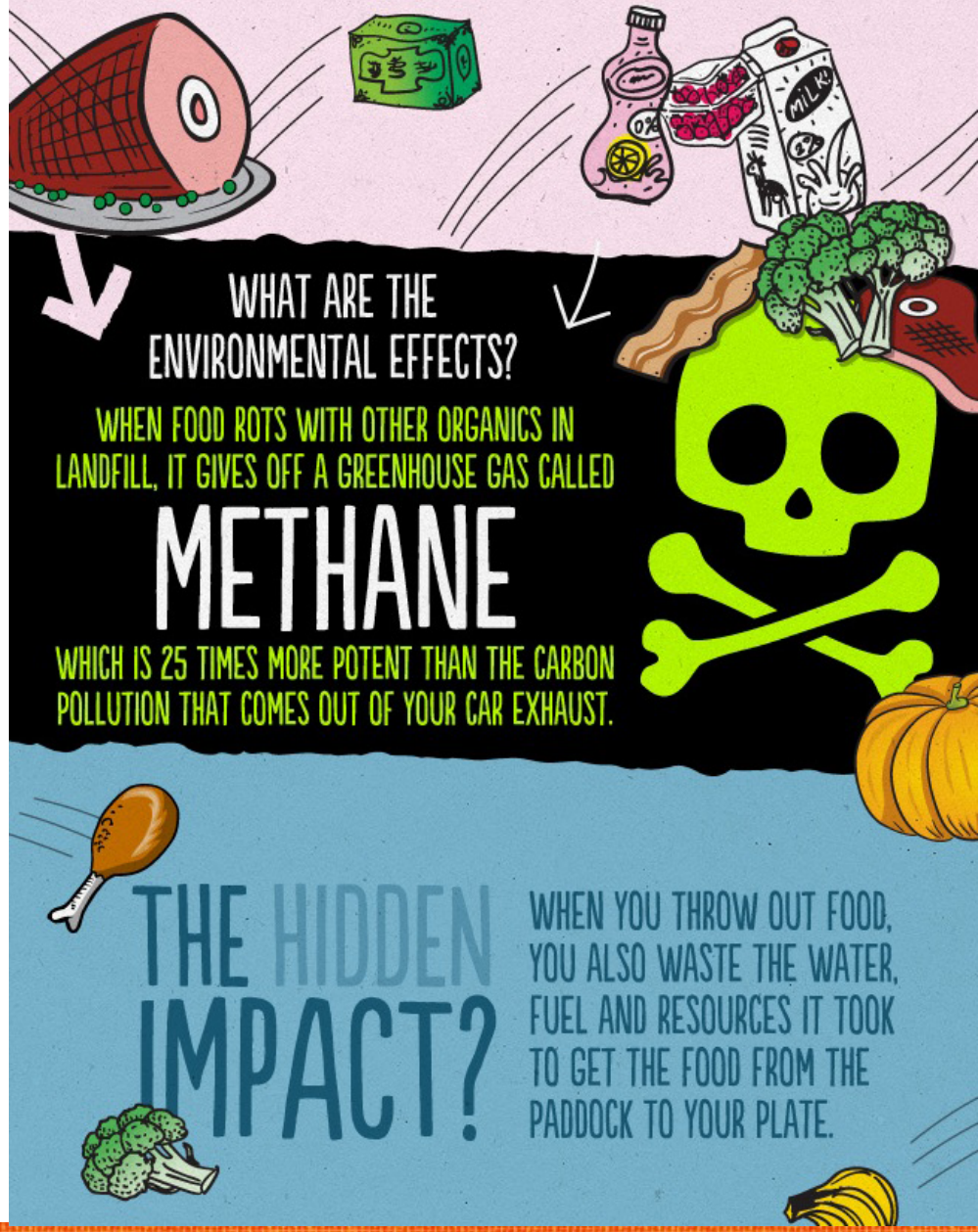
COMPOST

A compost pile undergoes aerobic decomposition. Because it is exposed to oxygen, either by turning it or through the use of living organisms, it produces carbon dioxide instead of methane. The food waste decomposes faster and can be reused as fertilizer.



Source: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

KATHRYN HOLLOWAY / NEWS&GUIDE



Systems

- Compost bin
- Digestors
- Worm farm

What do I need?

What do we currently use?	❑ Compost bin	❑ Digester	❑ Worm farm	❑ Worm tower	❑ None or other
How much food waste does our household create each week?	❑ 6 kg	❑ 5 kg	❑ 14 kg	❑ 2 kg	❑ 15kg + ❑ No idea
Do we have meat and dairy scraps in our food waste?	❑ No	❑ Yes	❑ No	❑ No	❑ Small amounts ❑ Large amounts
Do I need to recycle garden material?	❑ Yes	❑ No	❑ No	❑ No	❑ Occasionally
What location do I have in mind?	❑ Full sun	❑ Full sun	❑ Full shade	❑ Veggie garden or fruit tree	❑ Space challenged ❑ Unsure
Total number of ticks					
Does what you have match your needs?	**A compost bin would suit our home best**	**We need a digester**	**I'll look into a worm farm**	**A worm tower is perfect for me**	**We will need to think about this very creatively**

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Food waste caddy

For collecting food waste in your kitchen

- Can be an upcycled container
- Purchased kitchen caddy
- Easy to clean
- Best if no air holes
- Compostable lining/ newspaper optional
- Empty and wash daily

Waste data

- Need scales and a log-book
- Weigh in kg (minus caddy)
- Record food waste for 1 week
- X 52 for annual

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Compost bin

- Aerate
- Keep covered
- Keep moist


1.
GREENS
bring **nitrogen**
to the mix


2.
BROWNS
add **carbon**
to the mix


3.
MOISTURE
supplies **water**
to the
microorganisms


AERATION
provides **oxygen**
to the
microorganisms
4.

Carbon (brown) to nitrogen (green) ratio is

30:1

A bucket for a bucket

Carbon:

Animal hair
Cardboard
Dry leaves
Hay
Paper towels
Sawdust
Shredded paper
Small twigs
Straw
Wood ash
Woodchips

Nitrogen:

Aged manures
Coffee grounds
Food waste
Grass clippings
Green leaves
Manure (chickens or herbivores)
Soft pruning
Tea bags
Weeds (no seeds/ soaked)

Growing compost herbs

“Regular handfuls of chamomile, dandelion and yarrow leaves and flowers will all speed up decomposition of the compost with yarrow being the most effective. Yarrow also adds copper, nitrates, phosphates and potash while chamomile adds calcium and ‘sweetens’ the mixture. Dandelions contribute copper, iron and potash. Nettles are problem weeds but they actually improve the quality of the soil they are growing in and when added to the compost they contribute iron and nitrogen. Tansy adds potassium, which is very important for plant growth while valerian increases the phosphorous content so essential for good flowers and fruits. Probably the most useful compost plant is comfrey. The leaves are rich in potassium, nitrogen, calcium and phosphates. I keep a clump growing next to the compost and add a handful of leaves whenever I throw in kitchen scraps. “

Penny Woodward

What does compost look like when it's ready?

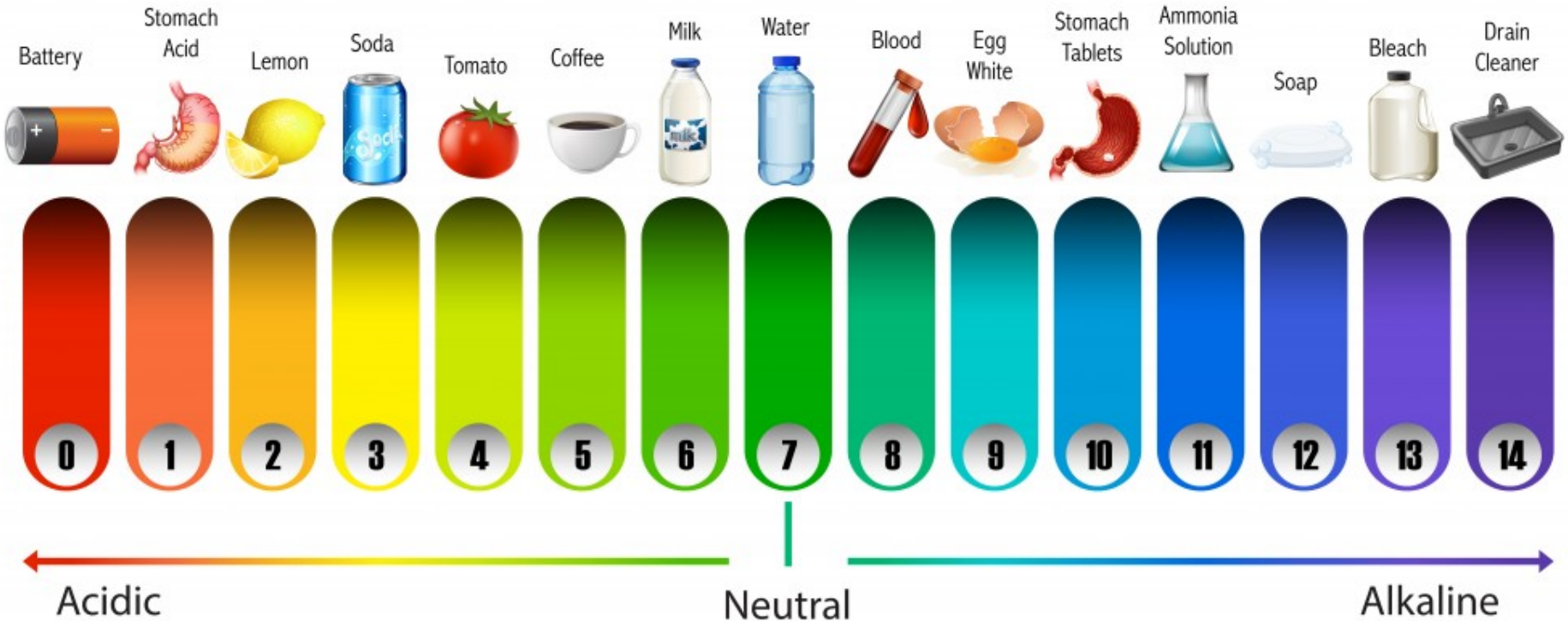
- It's the colour of 70% dark chocolate
- It's fluffy and has good 'crumb' structure
- When you squeeze a handful of it in your fist, one drop of water will come out of it
- It smells sweet and earthy

Using compost

Put on the garden

Test pH

Understanding pH



Testing pH

pH Test Kit

Use a soil pH kit to test:

- Compost
- Digestate
- Garden soil
- Worm castings
- Does the colour change when we add lemon juice/wood ash, how?


SOIL pH
TEST KIT
C D W

Compost troubleshooting

Lack of moisture

- Feels, looks dry
- Add water to pile after every 10 cm of new material

Lack of oxygen

- Matted ingredients; large quantities of leaves, sawdust or grass added in clumps
- Add oxygen: Turn pile, or fluff
- Mix ingredients well when building, esp. those that tend to mat

Compost troubleshooting

Lack of nitrogen

- Pile doesn't heat up; slow decay
- Add high-nitrogen material: blood meal, manure
- Sprinkle high-nitrogen material over every 10 cm of new material as pile accumulates

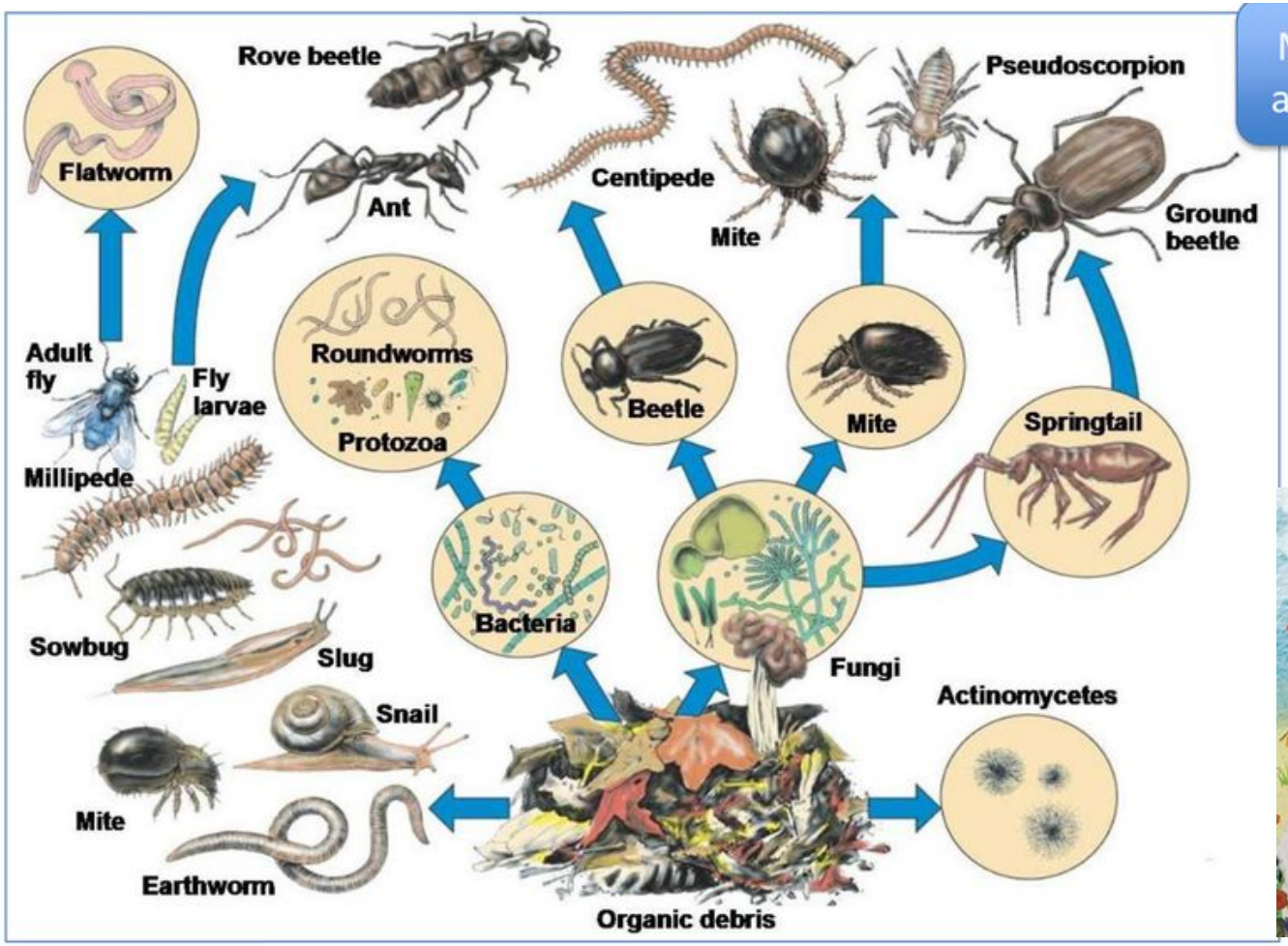
Lack of micro-organisms

- None of the other factors apply; pile still doesn't heat up
- Add micro-organisms directly (inoculant) or indirectly (fresh compost, soil)
- Don't build piles on concrete/plastic sheets
- Save some fresh compost from finished pile to incorporate into new pile

Rodents

- You see them.
- Add thick nitrogen and carbon layer to increase heat in bin
- Dig the base in, start with a good layer of soil
- Add wire to the base to prevent them burrowing in

Compost critters



Most critters are beneficial

Open bay composting

Pros and cons

- Attracts rodents
- Fast process
- Hard yakka
- Takes up space

Tumbler composting

Pros and cons

- Easy to aerate
- Getting compost
- Less bending
- Weight can be an issue

Tumbler composting

Trench composting

Trench composting

Pros and cons

- Dig deep
- Easy to set up
- Needs space
- Requires digging

Cold/hot composting

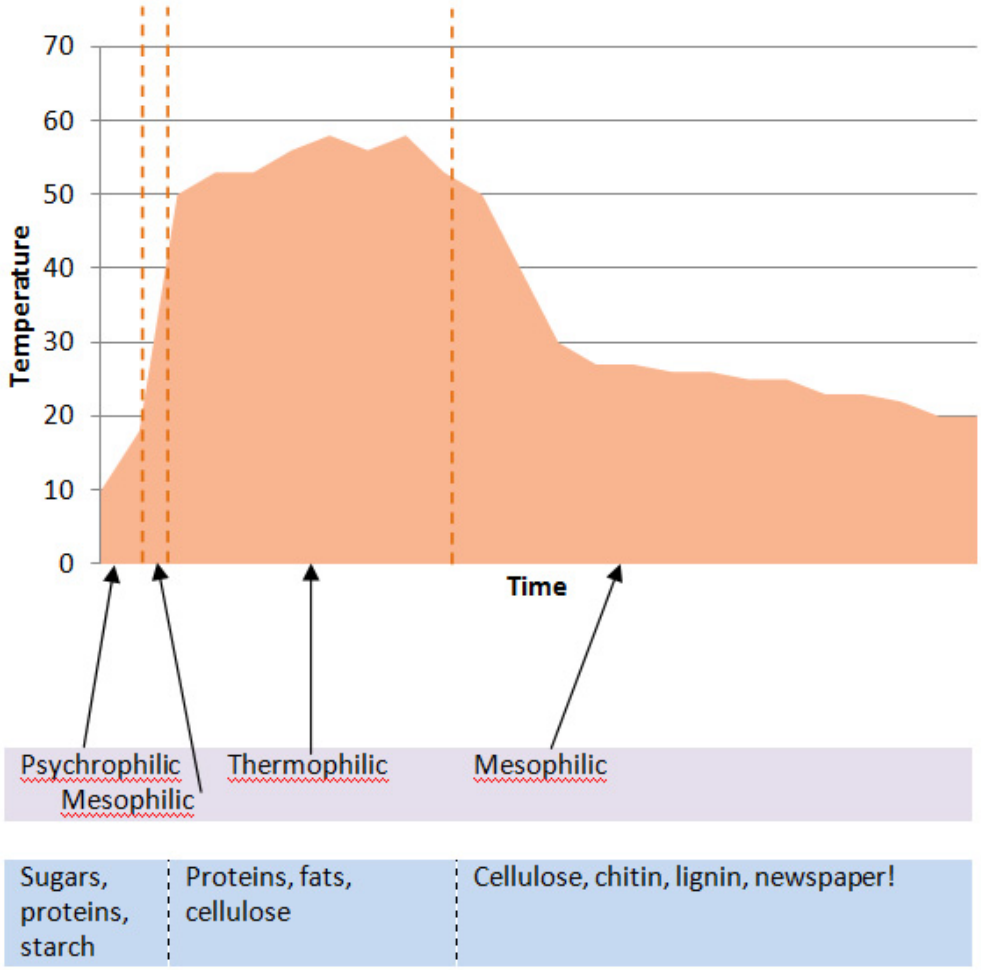
Cold composting

- 0-40 degrees Celcius
- Not as active in winter
- Slow process
- Weed seeds not killed
- Takes up to 18 months to reach sanitation
- Conserves nitrogen
- Little maintenance

Hot composting

- 40-75 degrees Celcius
- Active all year
- Fast process
- Will kill most weed seeds
- Kills pathogens and unwelcome bacteria
- Loses nitrogen
- High maintenance

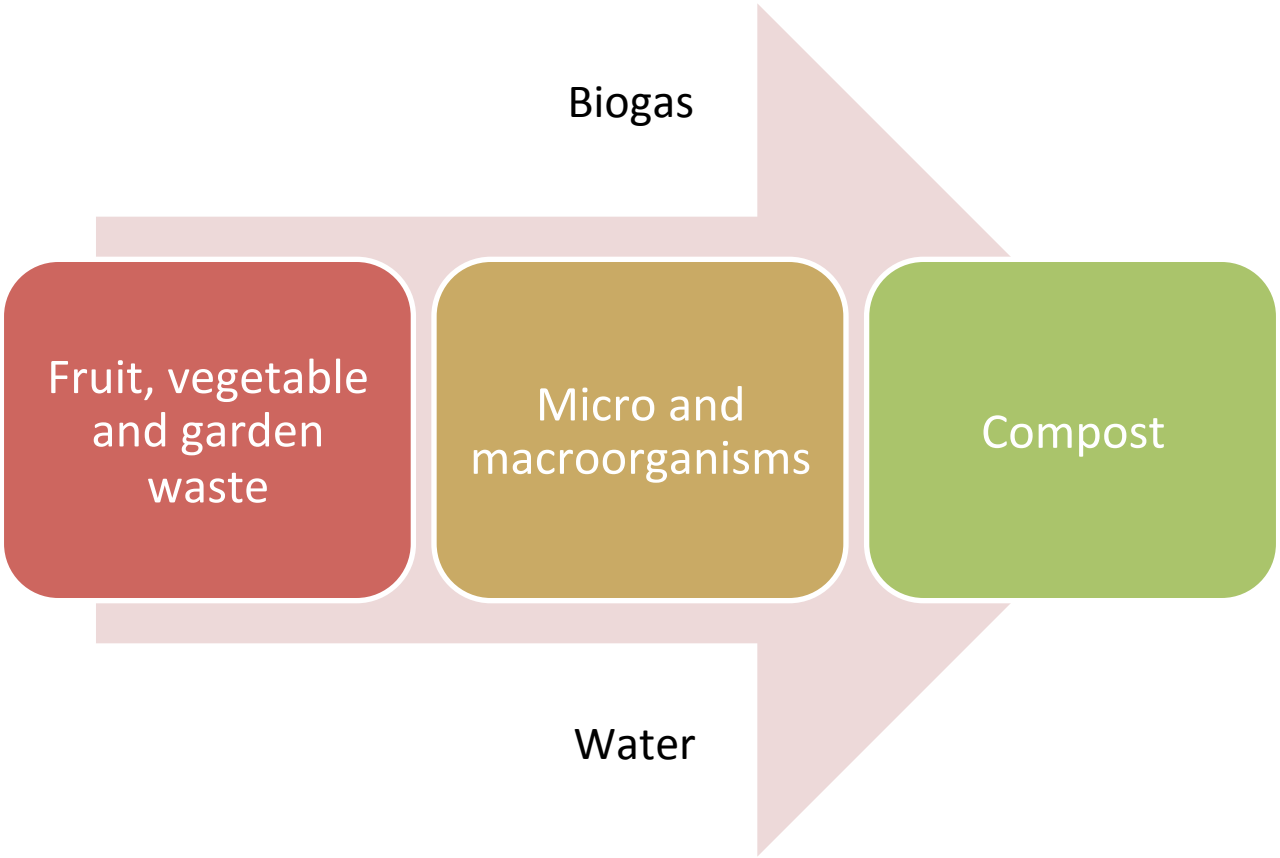
Bacteria types



There are three types of bacteria that get to work at different times in a compost bin:

- **Psychrophilic** – appear when the compost is new and cold. They prefer temperatures between 10 and 21C.
- **Mesophilic** – are dominant when the internal temperature rises to 21 - 38C. If there is not enough nitrogen or oxygen the compost will stay at this phase and will not develop further, so the pile needs to be turned to give these bacteria plenty of food.
- **Thermophilic** – appear when the compost gets hot. It's only after the temperature reaches about 70C or they run out of carbon that the population declines.

Composting (aerobic)



Indoor composter

- Add micro bran frequently
- Drain frequently a
  wash after each use.

1. ADD

2. SPRINKLE

3. BURY

4. GROW

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Green Cone
Food Waste Digester

Green Cone is an unique and environmentally-friendly solution for disposing of household food waste. The unit accepts all cooked and uncooked food waste including vegetable scraps, meat, fish, bones, dairy products and other surplus organic kitchen material. Nature does the rest, reducing the Cone's contents to its natural components of water and carbon dioxide. Designed for a sunny position in a well drained garden, a Green Cone is suitable for use by an average family of four people. The Cone may need emptying every few years.

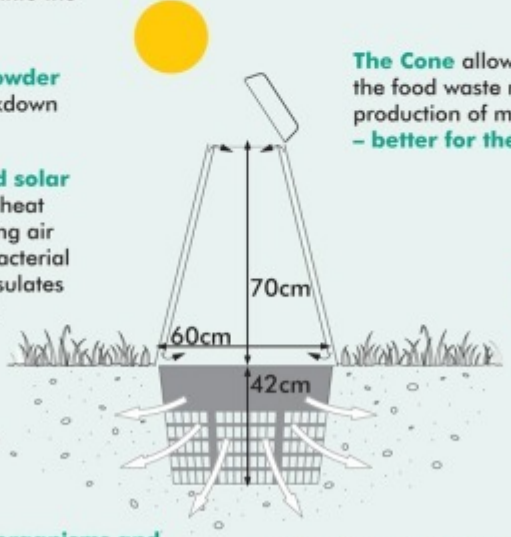
Sunlight provides energy source

Removable top section for easy access into the cone

Accelerator powder enhances breakdown of food

Double-walled solar cone creates a heat trap of circulating air to encourage bacterial growth. Also insulates waste in winter.

Soil filters out smells and prevents access by flies.



The Cone allows air to get to the food waste reducing the production of methane gas **– better for the environment**

Rich Soil Conditioner seeps into surrounding ground.

Natural Micro-organisms and Worms migrate freely in and out of basket and break down the waste.

Over 90% of the waste material in your Green Cone will be absorbed as water by the soil.

YES!

Add these to your cones:

- **Fish ~ Meat ~ Poultry**
- **All bones**
- **Bread**
- **Fruit** *(including peelings)*
- **Vegetables** *(including peelings)*
- **Dairy products**
- **Raw and cooked food scraps**
- **Crushed egg shells**
- **Tea bags**
- **Coffee grounds** *(but not coffee filters)*
- **Small amounts of animal excrement**

NO!

Keep these out:

- **Metal ~ Wood**
- **Plastic ~ Glass**
- **Paper ~ Straw**
- **Bulk oil**
- **Disinfectant ~ Bleaches**
- **Grass cuttings ~ Hedge clippings**
- **Large amounts of coarse vegetable matter** *(corn husks, pea shells, etc.)*

(While digestible, large quantities fill a cone – compost it instead!)

What to Feed Your Green Cone
(and what not to)

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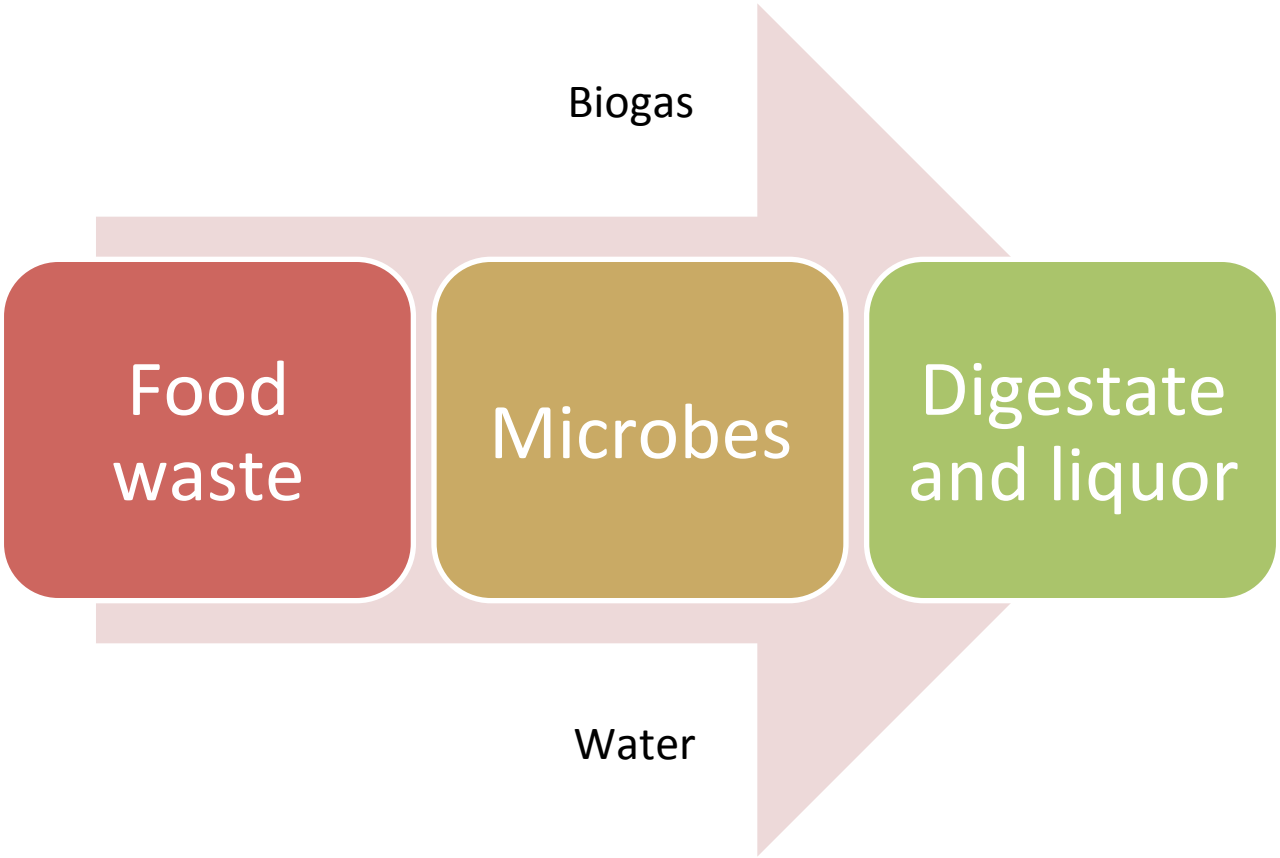
Anaerobic Digestion



Comparison

Digestion

- Fermentation
- No nitrogen loss
- Produces methane (CH_4)*
- Special microbes
- Acidic
- Ideal C:N ratio 10:1

Composting

- Heat
- Loss of nitrogen
- Produces carbon dioxide (CO_2)
- Soil microbes
- Loss of energy
- Ideal C:N ratio 30:1

*Methane (CH4) is a more potent greenhouse gas twenty times more damaging to the environment than is carbon dioxide.

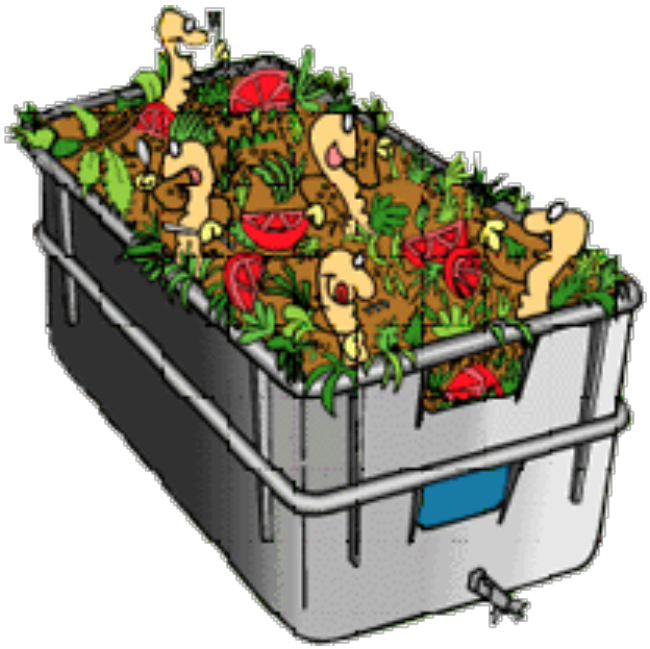

Indoor or outdoor
Full shade
Food waste only
Fruit and vegetable scraps
Composting worms for set up

Worm farm

- Food waste added at the top
- Worm castings and tea collected at the bottom
- Worm activity slows over winter
- Care needed on very hot days

Variations

- Apartment blocks



- Worm tower

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Common worm species

Red and tiger worms

- Most used in vermiculture
- They breed quickly (1 worm will produce 9 worms per week under ideal conditions)
- Suited to both hot and cold conditions
- Breeding will slow in temperatures over 25 degrees Celcius
- Grow to 50mm long

Indian blues

- Spenceralia, an Australian native
- Fastest breeding worm (1 worm will produce 18 worms per week under ideal conditions)
- Fast
- Prefers warmer climates
- Mature length is around 50mm

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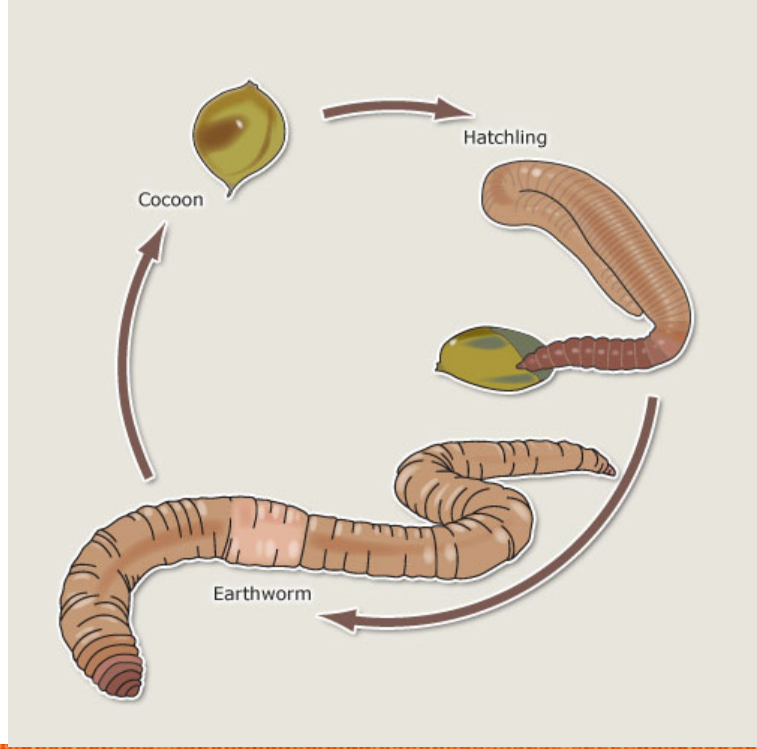
Worm Juice

- Dilute like cordial 1:10 (worm juice: water)
- Use within 24 hours on garden or pot plants

A typical WORM JUICE sample analysed:

- Healthy bacteria 100,000 CFU/ml
- Nitrogen(N) 64 mg/L
- Phosphorus(P) 21 mg/L
- Potassium(K) 940 mg/L
- Sulphate 82 mg/L
- Calcium 62 mg/L
- Magnesium 150 mg/L
- Sodium 120 mg/L
- Copper 276 ug/L
- Zinc 105 ug/L
- Manganese .26 mg/L
- Iron 1.5 mg/L
- Boron .41 mg/L



Troubleshooting

- Ants or coakroaches: too dry, water
- Hot days: add an ice brick to the worm farm
- Maggots: remove all meat and dairy
- Smell: check darinage, sprinkle over a handful of ash, dolomite or garden lime
- Vinegar flies: cover your worms with a worm blanket, old cloth, damp newspaper or hessian sack
- Worst case scenario - empty the worm farm and start again with some new worms


ST JAMES
GARDENS

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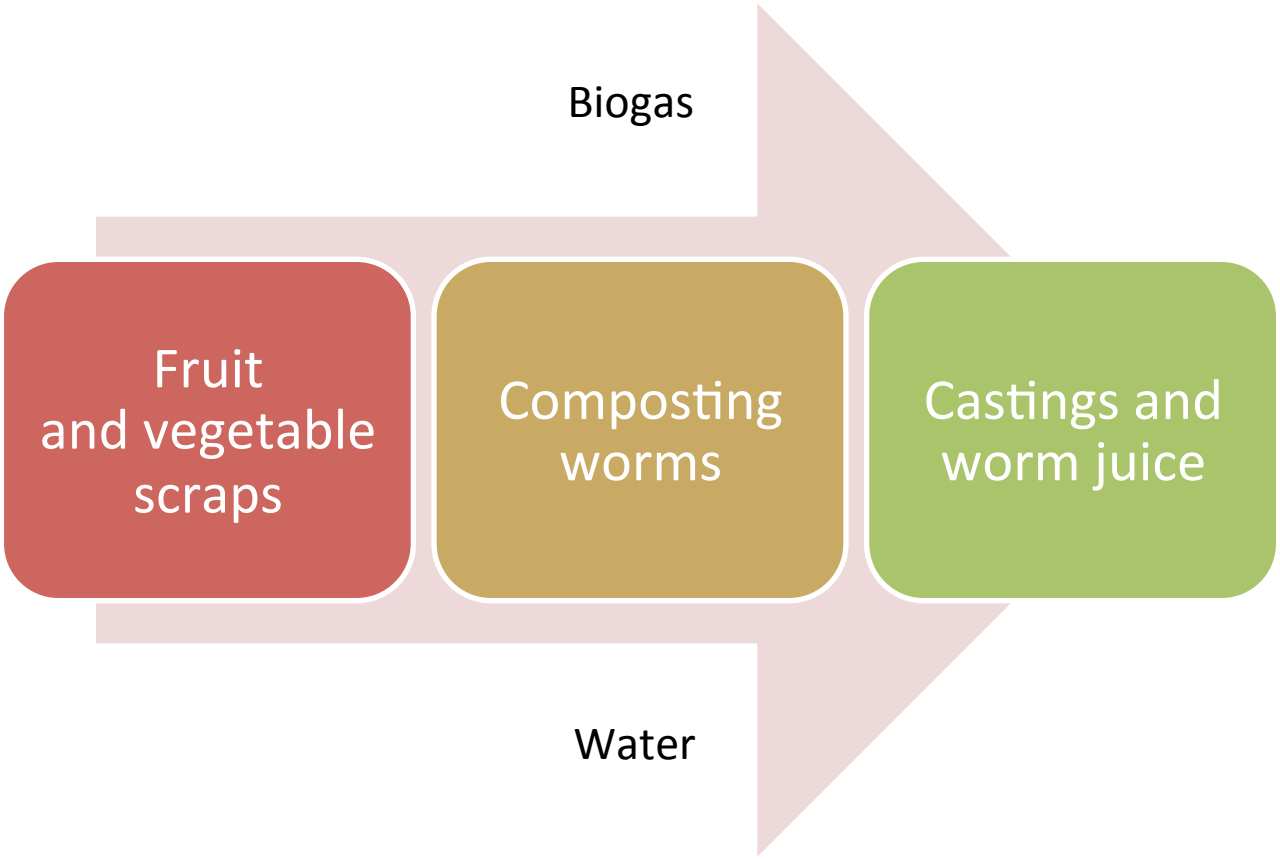
Subpod.com.au

Go Underground

Going underground means we're composting with worms and microbes in their natural habitat.

Subpod's unique design means there's no smells and no pests, and your worms can roam freely in and out of the Subpod, feasting, then feeding the soil at the plant root level - right where your plant's mouths are!

Worm farming



Making the choice

Options	Gedye Compost bin	Green cone Digester	Hungry bin Worm farm	Tumbleweed Worm tower
Look				
Cost	$82 per bin	$229 per cone	$399 per farm	$30 pet tower
Set up cost	No	Accelerator powder $30	Initial worms (2,000) $50	Initial worms (2,000) $50
Amount of food waste recycled	Medium capacity 6 kg	Medium capacity 4kg per week	High capacity 14 kg per week	Low capacity 2 kg
Meat and dairy acceptable	No	Yes	No	No
Add garden material	Yes (needs carbon added regularly)	No	No	No
Location	Full sun	Full sun	Full shade	Veggie garden or fruit tree
Product	Compost	Liquid fertiliser and organic matter go directly into ground	Worm castings and worm tea	Worm castings and liquid fertiliser go directly into the ground

Pet waste including organic cat litter

'There are over 4 million dogs in Australia each producing up to 100kg of waste annually. If left uncollected it pollutes public areas and rain washes it into our waterways.'

- Select a spot in your garden away from edible plants and phosphorus sensitive native plants.

Suppliers

- Bunnings - https://www.bunnings.com.au/our-range/garden/gardening/composting/compost-bins
- Compost revolution - https://compostrevolution.com.au/about/
- Worms - https://:www.kookaburrawormfarms.com.au https://www.wormlovers.com.au/ and http://wormz.com.au/

ShareWaste

Connect people who wish to recycle their kitchen scraps with their neighbours who are already composting, worm-farming or keep chickens. Divert waste from landfill while getting to know the people around you!

https://sharewaste.com/

Organics recycling

https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability/waste/organic-waste

Links

- Sustainability Victoria https://www.sustainability.vic.gov.au/You-and-Your-Home/Waste-and-recycling/Food-and-garden-waste/Compost

Yarra Ranges Gardens for Harvest

Join Gardens for Harvest for **free** and receive:

- a welcome kit and home growing guide
- monthly reminders on growing and caring for your garden
- seasonal recipes and expert tips
- information on upcoming gardening workshops
- opportunities to meet other gardening enthusiasts from our growing member network

Yarra Ranges Gardens for Harvest

Home Composting Rebate - of up to **$40** to purchase eligible items for home composting and start composting food waste at home.

Eligible items include:

Compost bin
'Compost Mate' turning tool
Compost/Worm Farm blanket
Worm Farm
Composting Worms
Bokashi Bin

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Our services – how we can help you

Community gardens and urban agriculture

- Consultation, governance and design

Food growing at home

- Workshops on garden design, getting started in the veggie garden, growing native edibles, growing vegetables in small spaces, interesting edible plants to grow at home, improving soil, keeping chickens

Food waste avoidance and food waste recycling

- Advanced home composting, beginner composting and worm farming, food waste recycling, love food hate waste, school food waste recycling

Project that builds community through engagement

- Setting up a community garden and compost hub

Making the most of your outdoor classroom

- Food gardening with children, nature play in early childhood, setting up a school food garden, sustainability

Thank you!

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Questions