

COMPOSTING

For Rural India



Saahas

Saahas is an NGO working in the field of **solid waste management** since **2001**. With projects spanning **12 states** across India, Saahas operates on the principles of a **circular economy**, focusing on sustainable waste management and resource efficiency. Saahas develops and implements waste management solutions for **urban and rural areas** by collaborating with several stakeholders like the government, businesses, waste generators, waste workers and recyclers, etc. to minimise the waste footprint of different communities.

PROBLEM STATEMENT

Due to a lack of proper solid waste collection, management system and infrastructure, villages are facing the challenges of open waste dumping and burning. This leads to a host of environmental issues along with lack of visual cleanliness, air pollution, bad odor & spread of diseases. By practicing source segregation of waste, and composting the bio degradable fractions, majority of these challenges can be eliminated.



Source: Canva

WET WASTE MANAGEMENT STRATEGIES IN VILLAGES:

1. Used in fields, gardens, backyards or flower pots
2. Diverted as animal feed
3. **Composting**
4. Biogas
- ~~5. Dumping on streets, drains and waterbodies~~
- ~~6. Burning of wet waste~~



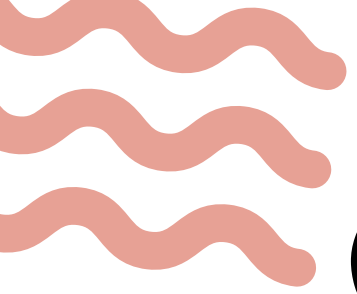
<https://www.youtube.com/watch?v=cTs2Lly8-zQ>



<https://www.youtube.com/watch?v=-rOnWolo06Y>



Source: Canva



CONTENTS:



1. What is composting?
2. What to compost, what not to compost
3. How to compost?
 - 3.1. List of greens and browns
 - 3.2. Carbon to Nitrogen Ratio
4. Methods of composting in rural areas
5. Uses of compost
6. Troubleshooting composting issues
7. fAQ



1.

WHAT IS COMPOSTING?

- Composting is the conversion of wet/organic waste into nutrient-rich fertiliser that enriches soil.
- Can be done in a container or open space
- Occurs fast in warm weather between 20 to 42 degree celsius

Benefits of composting:

Reduction of waste at source

Fuel

Soil's water-holding capacity

Reduction in GHG emissions

Soil fertility

Organic manure

Automatic source segregation



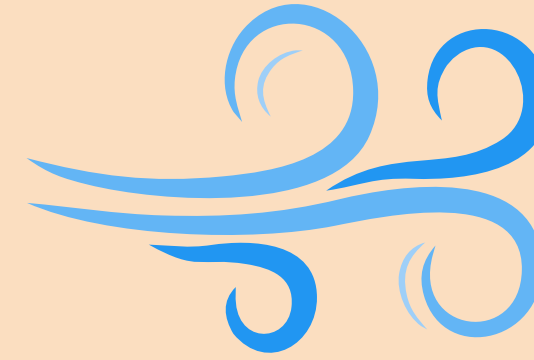
<https://in.pinterest.com/pin/compost-life-circle-infographic--149463281376964583/>

Inputs:



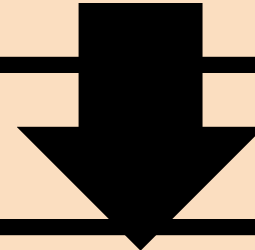
Wet waste

Browns (dry leaves/twigs etc)

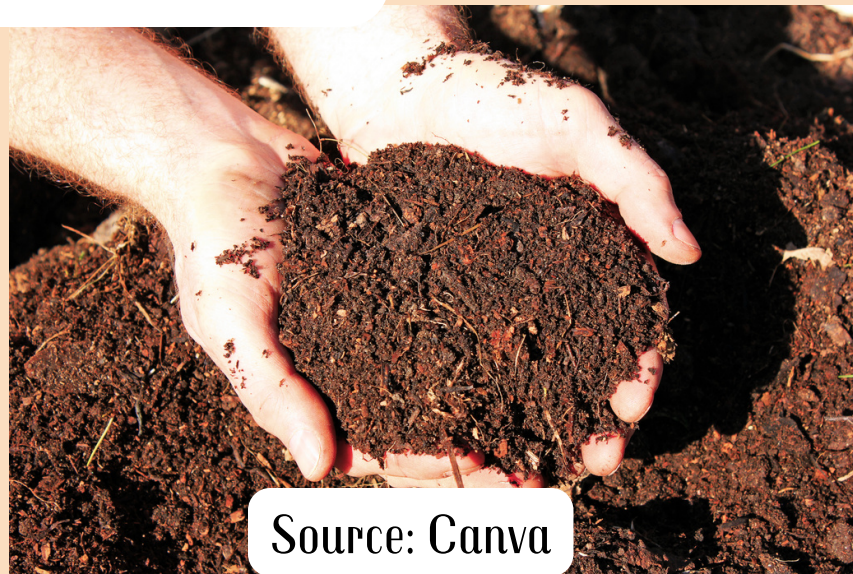


Air

Water



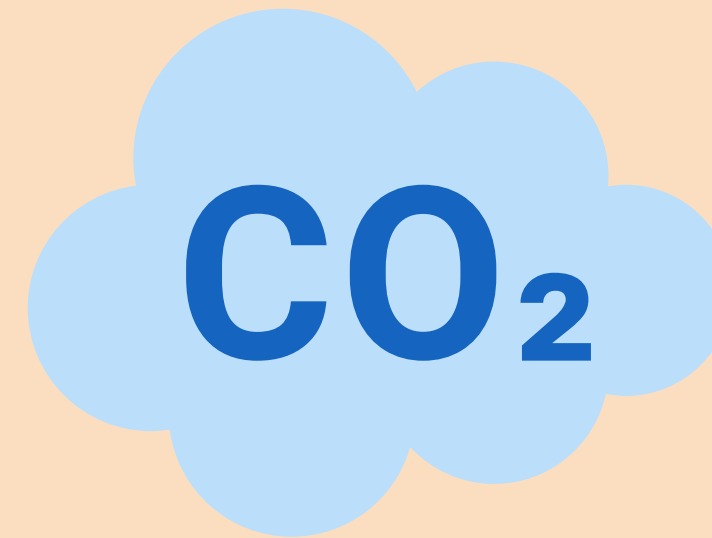
Outputs:



Compost



fermented organic manure (FOM)



2. WHAT TO COMPOST, WHAT NOT TO COMPOST

What To Compost



Vegetables



Fruits



Nut shells



Coffee, tea



Houseplants



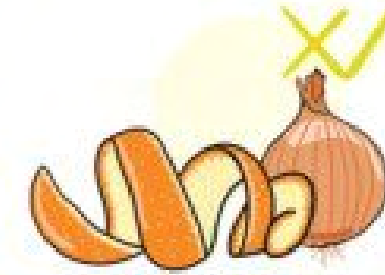
Eggshells



Paper napkins



Small Quantity:

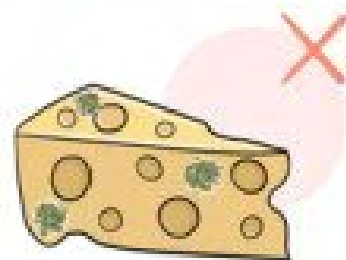


Citrus, onions

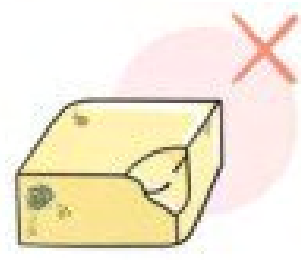


Ready-made products

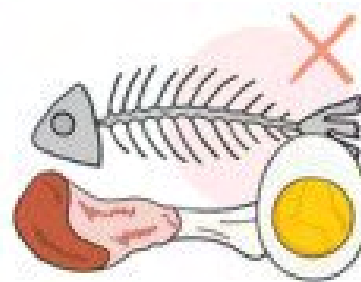
What Not To Compost



Dairy products



Fats and oils



Eggs, meat or fish bones and scraps



Animal feces

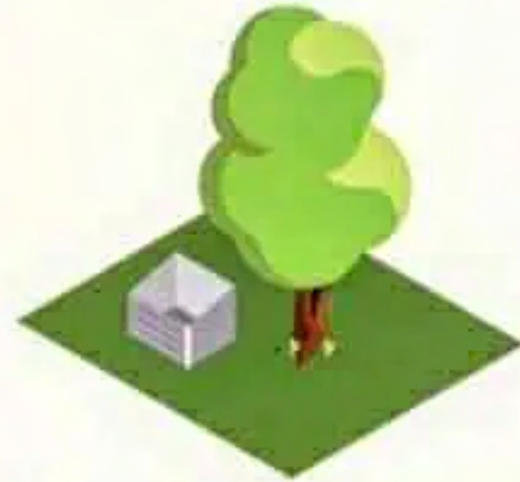


Diseased plants

(Except cow dung)

https://stock.adobe.com/in/images/infographic-of-composting-bin-with-kitchen-scraps-what-to-or-not-to-compost-no-food-wasted-recycling-organic-waste-compost-sustainable-living-zero-waste-concept/411860930?asset_id=411861350

3. HOW TO COMPOST?



- 1** Select a dry, shady spot near a water source. Ideal size for your compost area is 3 feet wide by 3 feet deep by 3 feet tall. You can buy a bin, use chicken wire, or just isolate an area of ground for your compost heap.



- 2** Add brown and green material in alternate layers. Try and keep the ratio roughly 3 parts browns to 1 part greens. Make sure larger pieces of material are chopped or shredded.



- 3** Keep the compost moist [but not too wet]. Moisture helps with the breakdown of organic matter.



- 4** Occasionally turn your compost mixture to provide aeration. This helps speed up the composting process and keeps things airy, which cuts the risk of things getting smelly.



- 5** As materials breakdown, the pile will get warm. There might even be steam. Don't be alarmed. That means it's working. Now you just have to wait.



- 6** All done! When material is dark with no remnants of food or waste, your compost is ready. Add it to lawns and gardens or anywhere that could benefit from some good soil.

<https://swachhindia.ndtv.com/album-detail/5-simple-steps-to-turn-household-waste-into-compost-24227/>

3.1 LIST OF GREENS AND BROWNS

Nitrogen Rich Content - Greens (C:N ratio)

1. Fruit including peels (35:1)
2. Vegetable including peels (25:1)
3. Used coffee and tea powder (20:1)
4. Leftover cooked food (20:1)
5. Green garden trimmings (30:1)
6. Used flowers (50:1)

Greens provide the moisture and nitrogen content required in the compost pile.

Carbon Rich Contents- Browns (C:N ratio)

1. Dry leaves (60:1)
2. Cocopeat / Shredded coconut husk (104:1)
3. Straw / Hay (75:1)
4. Sawdust / Paper (325:1)
5. Wood / Twigs (400:1)
6. Crushed cardboard (350:1)

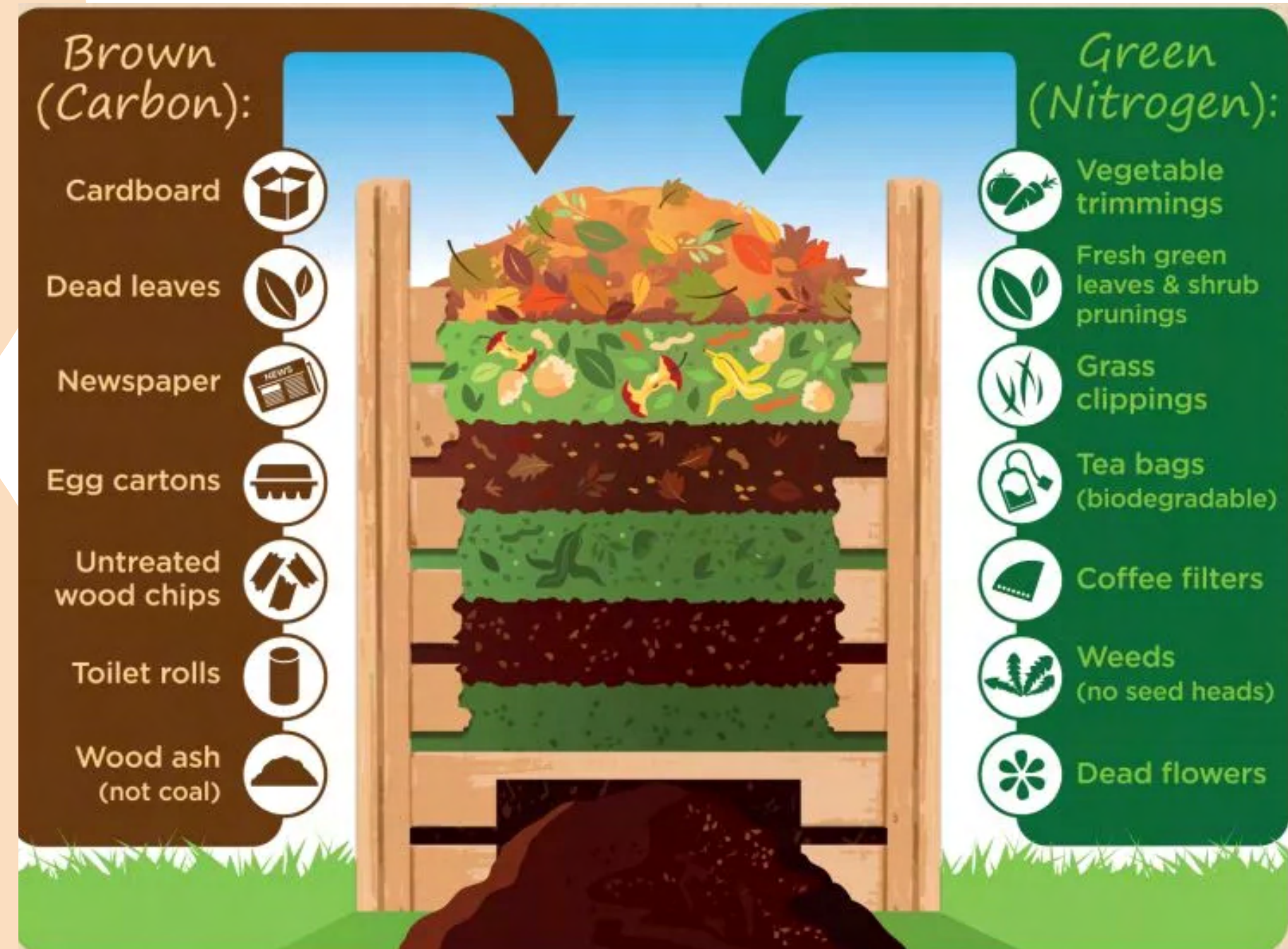
Browns reduce excessive moisture and provide carbon content to the compost.

3.2 CARBON TO NITROGEN RATIO

The C:N ratio of the materials can be calculated by using the previous table. For example, if you have two parts of leftover cooked food (C:N = 20:1) and one part of dry leaves (C:N = 60:1), then combined you have a C:N ratio of $(20:1 + 20:1 + 60:1)/3 = (100:3) = 33:1$.

Optimum C:N ratio (25:1 - 30:1) is a must for proper growth and upkeep of microorganisms in the process.

Alternate layers of browns and greens in the compost:



<https://www.gardenhealth.com/advice/how-to-guides-2/how-to-compost>

4. METHODS OF COMPOSTING IN RURAL AREAS

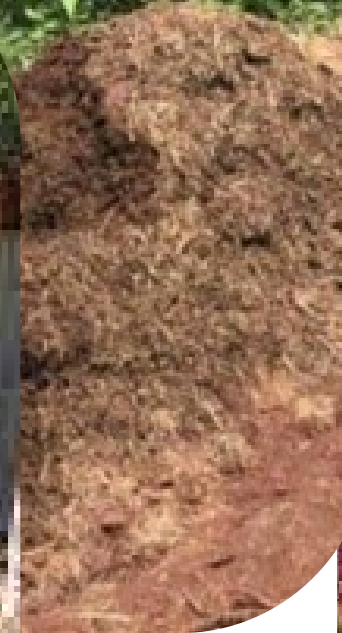
- a. Pot/Pipe/Drum composting
- b. Underground unlined manure pits
- c. Underground brick-lined manure pits
- d. Overground heap
- e. Overground brick-lined compost tank
- f. nADEP composting
- g. Indore method
- h. Vermicomposting
- i. Rotatory drum composting



<https://science.thewire.in/environment/why-indias-plan-to-turn-a-citys-waste-to-manure-failed/>



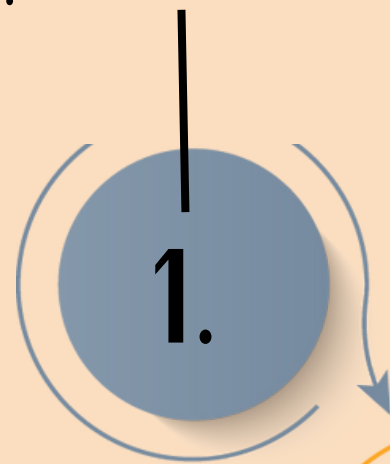
<https://thelogicalindian.com/environment/composting/>



<https://www.gettyimages.in/photos/manure-pit>

a. Pot/Pipe/Drum composting

Drill holes on to the pot/pipe/drum and the lid for aeration. Ensure a hole in the bottom to allow leachate to pass.



The pot/drum should be kept on a stand for stability. The pipes can be installed in the garden soil or a large pot.

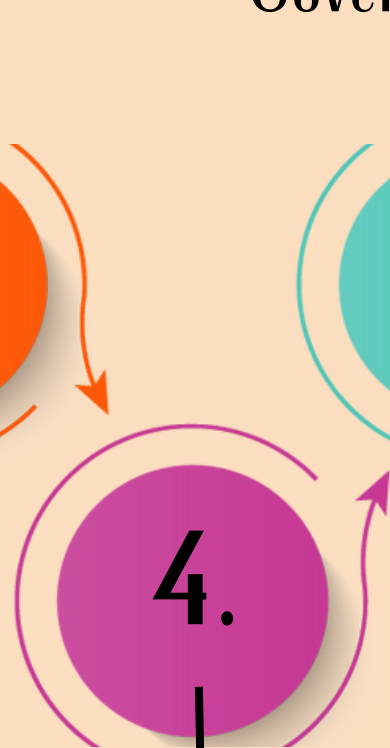
Add a layer of browns at the bottom of the container and add 2 spoons of accelerator.



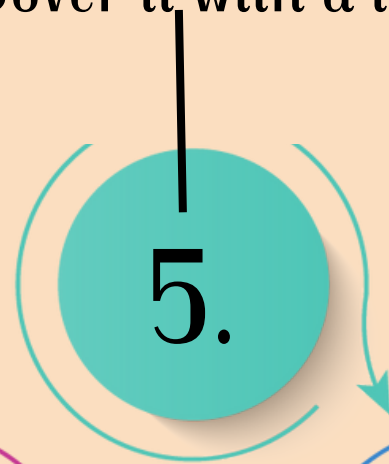
The wet waste should not be larger than 3-4 cms. Liquid from the food waste should be drained out.



Add layers of greens and browns along with the accelerator. Browns should atleast be half the amount of greens. Cover it with a lid.



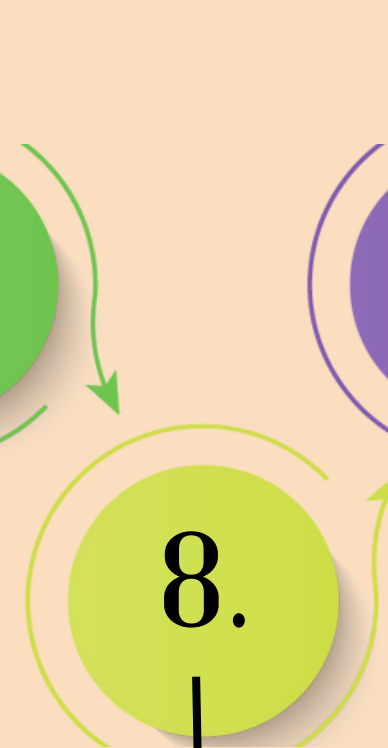
Keep adding the layers every day. Turn the pile once every 4-5 days.



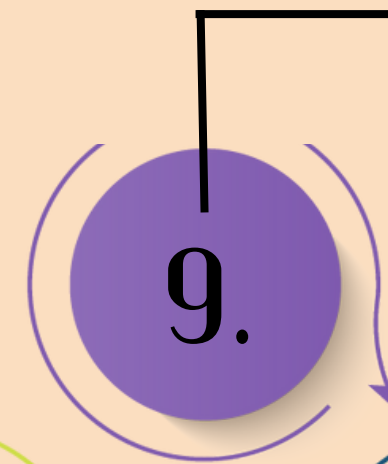
Once the container is full, leave it for 30-45 days for maturation.



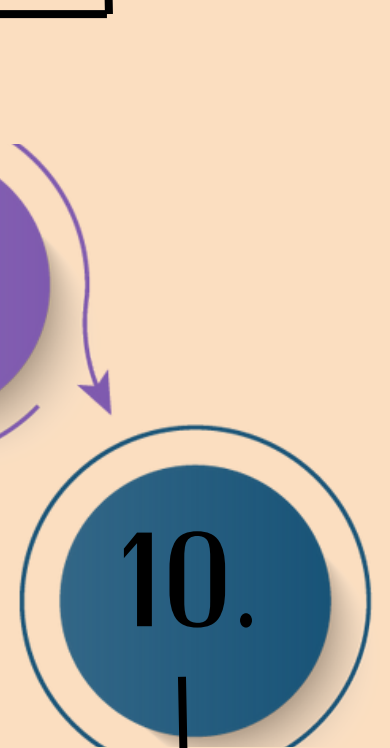
Meanwhile, use another pot/pipe/drum for composting.



Once the compost is ready, allow it to dry, screen it and use it as manure.



Empty the leachate container frequently because it has strong smell and attracts flies.



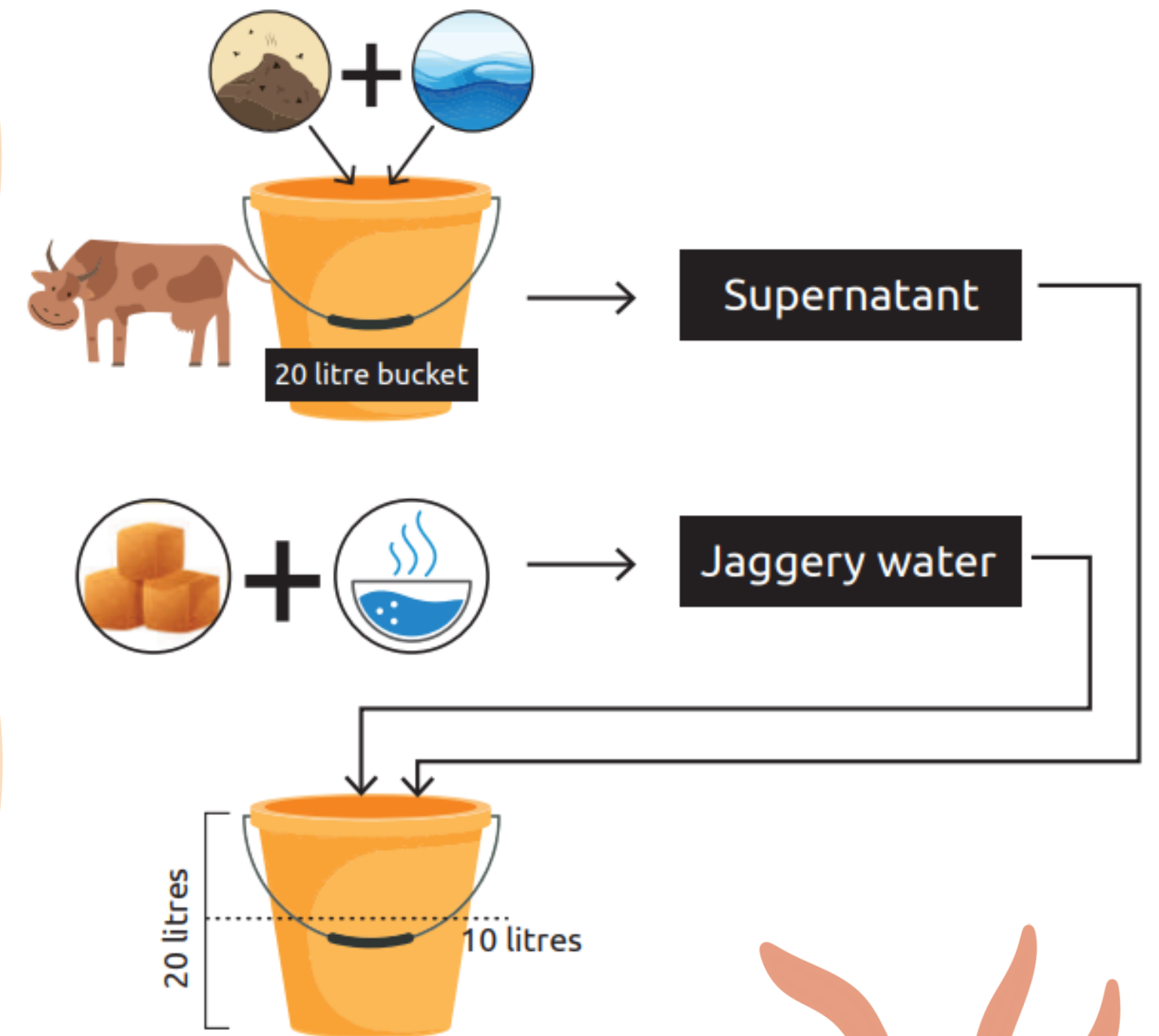
How to make accelerator at home?

Step 1: Mix 1-2 kgs cattle/buffalo dung with water, let it settle for 4-5 hours and take the supernatant out.

Step 2: Take 1 kg jaggery (or 0.5 liter molasses) and dilute it with warm water, let it cool.

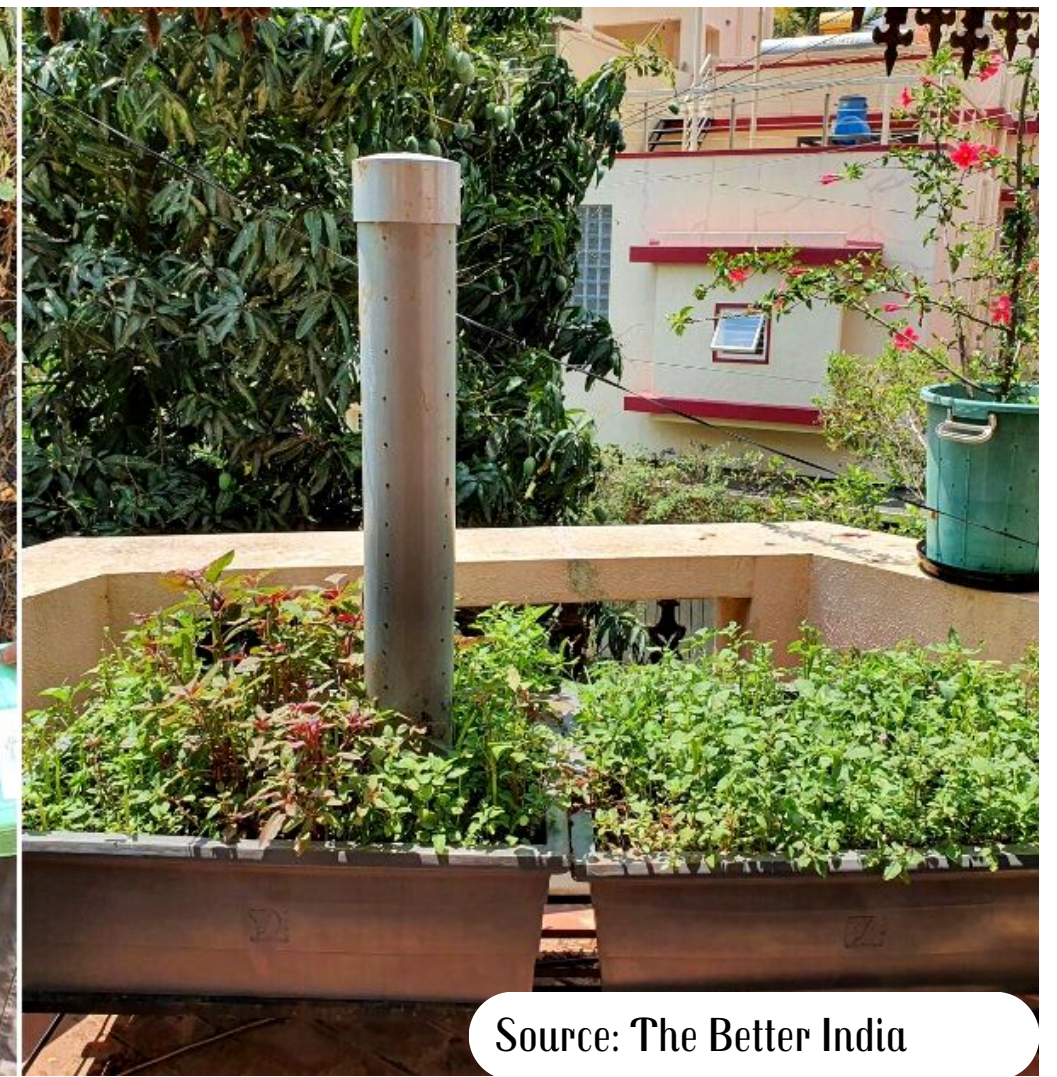
Step 3: Mix both the supernatant of dung and jaggery water in a 20 litre bucket, to up to 10 liters.

Step 4: Cover the solution and keep it for 3 days with stirring at frequent interval. Once there is a sweet aroma, it shows that the effective microorganism solution is ready for uses.





<https://www.dailydump.org/collections/terracotta-delivery/products/prithvi-khamba-earth-composter>



Source: The Better India



<https://directcompostsolutions.com/8-methods-composting/>

Add a layer of wet waste in the pit

1

Spread a thin layer of soil once a week to avoid odour and flies

3

Repeat the steps till the pit is full. Fill the pit up to 300 mm above the ground level

5

Plaster it with soil

7

After 3-6 months, compost can be taken out and be used

9

After garbage reaches height of 150mm, mix dung slurry (cow dung+water) and level it

2

Continue adding wet waste everyday

4

After 3-4 days, the waste above the ground settles down

6

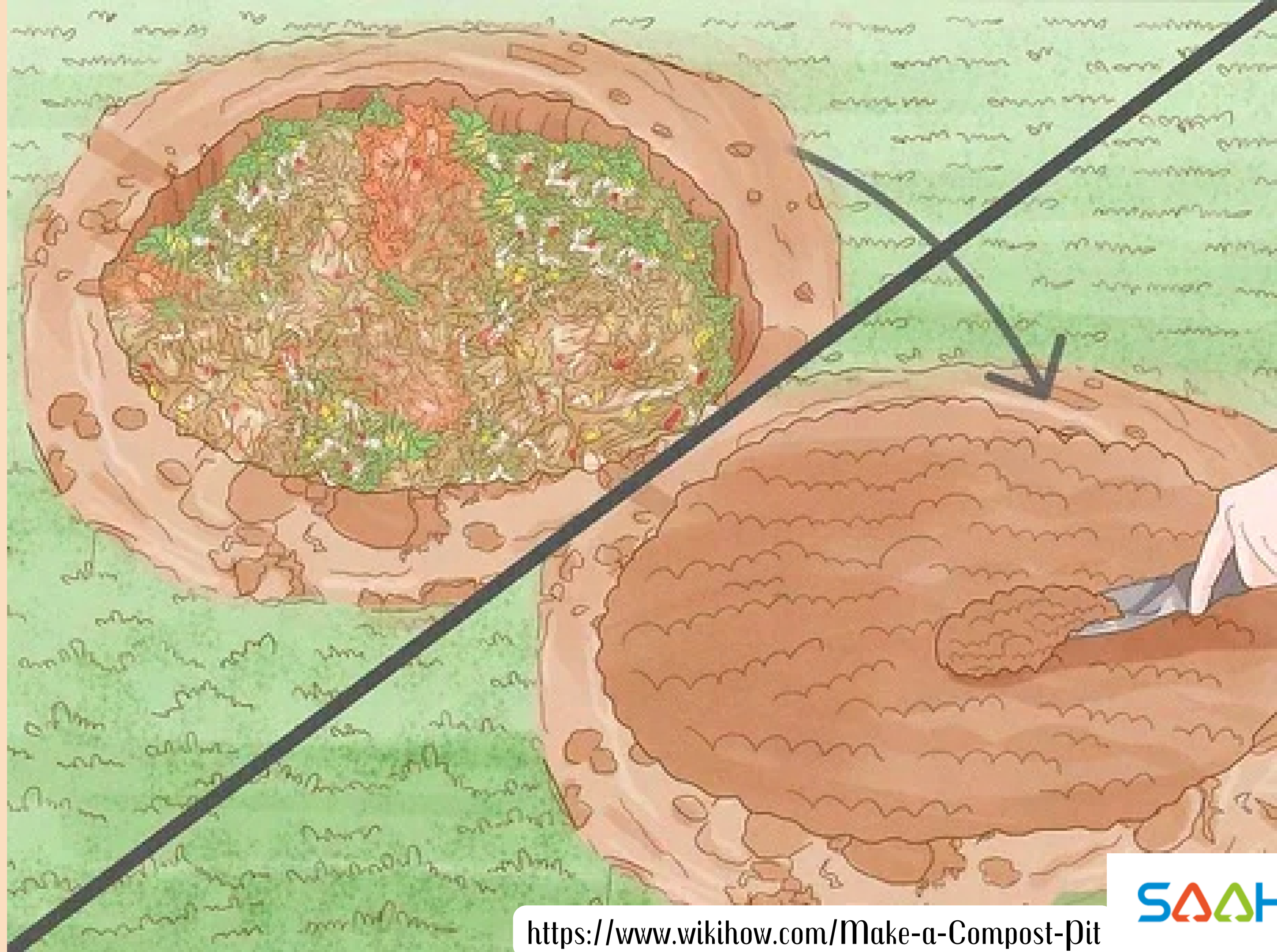
Leave the pit for 3 to 6 months for maturation

8

Meanwhile, use another pit of same dimensions dug at minimum 1 m away from the 1st pit

10

b. Underground unlined manure pits



<https://www.wikihow.com/Make-a-Compost-Pit>

c. Underground brick lined manure pits

1

Construct a circular pit having an inner dia of 1m, in honey comb 100mm thick brick masonry. The height of the circular pit should be 100mm above ground

2

Add a layer of wet waste in the pit

3

After garbage reaches height of 150mm, mix dung slurry (cow dung+water) and level it. Continue adding wet waste everyday

4

Spread a thin layer of soil once a week to avoid odour and flies

5

Repeat the steps till the pit is full. Fill the pit up to 300 mm above the ground level

6

After 3-4 days, the waste above the ground settles down

7

Plaster it with soil

8

Leave the pit for 3 to 6 months for maturation

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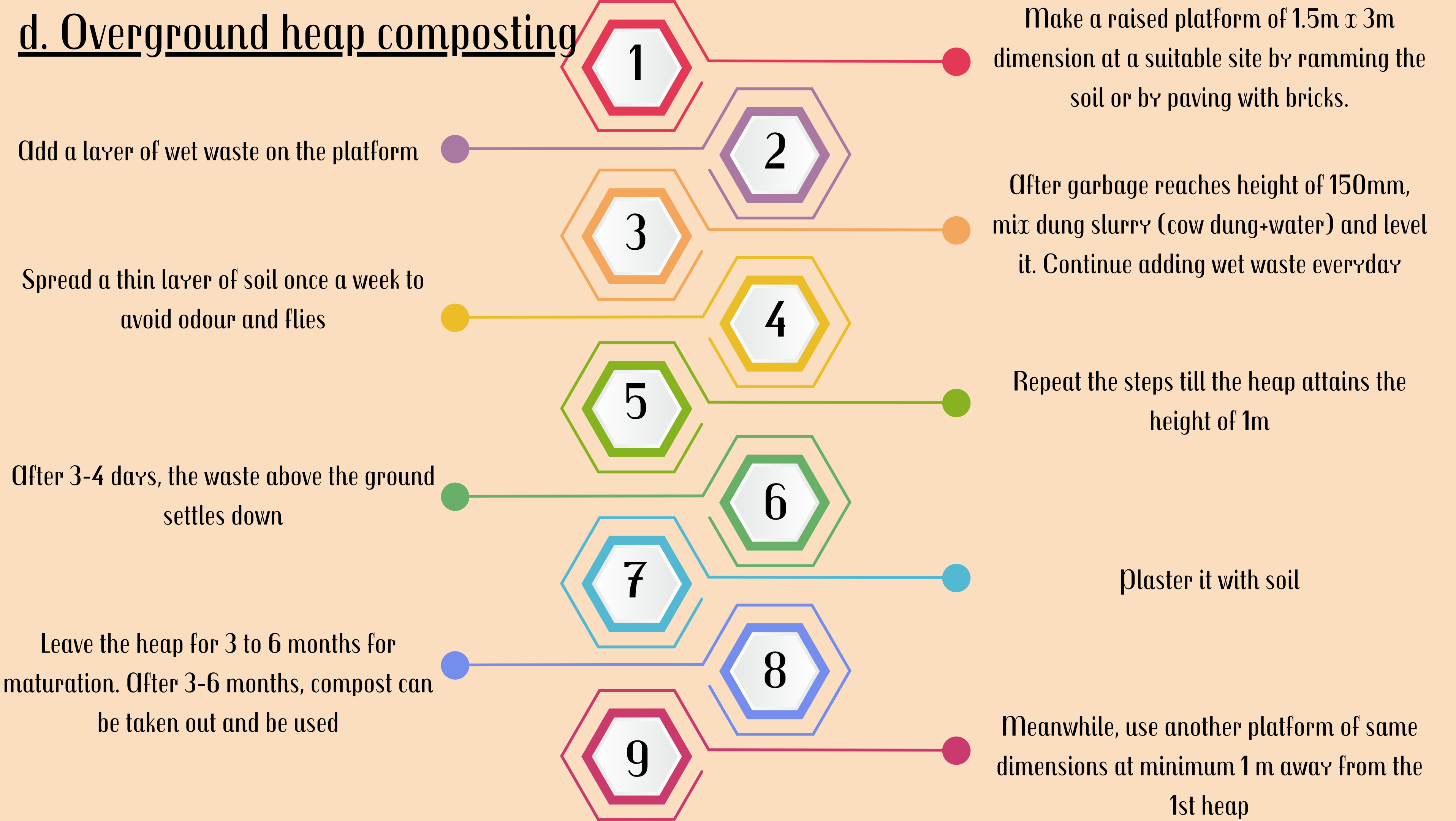
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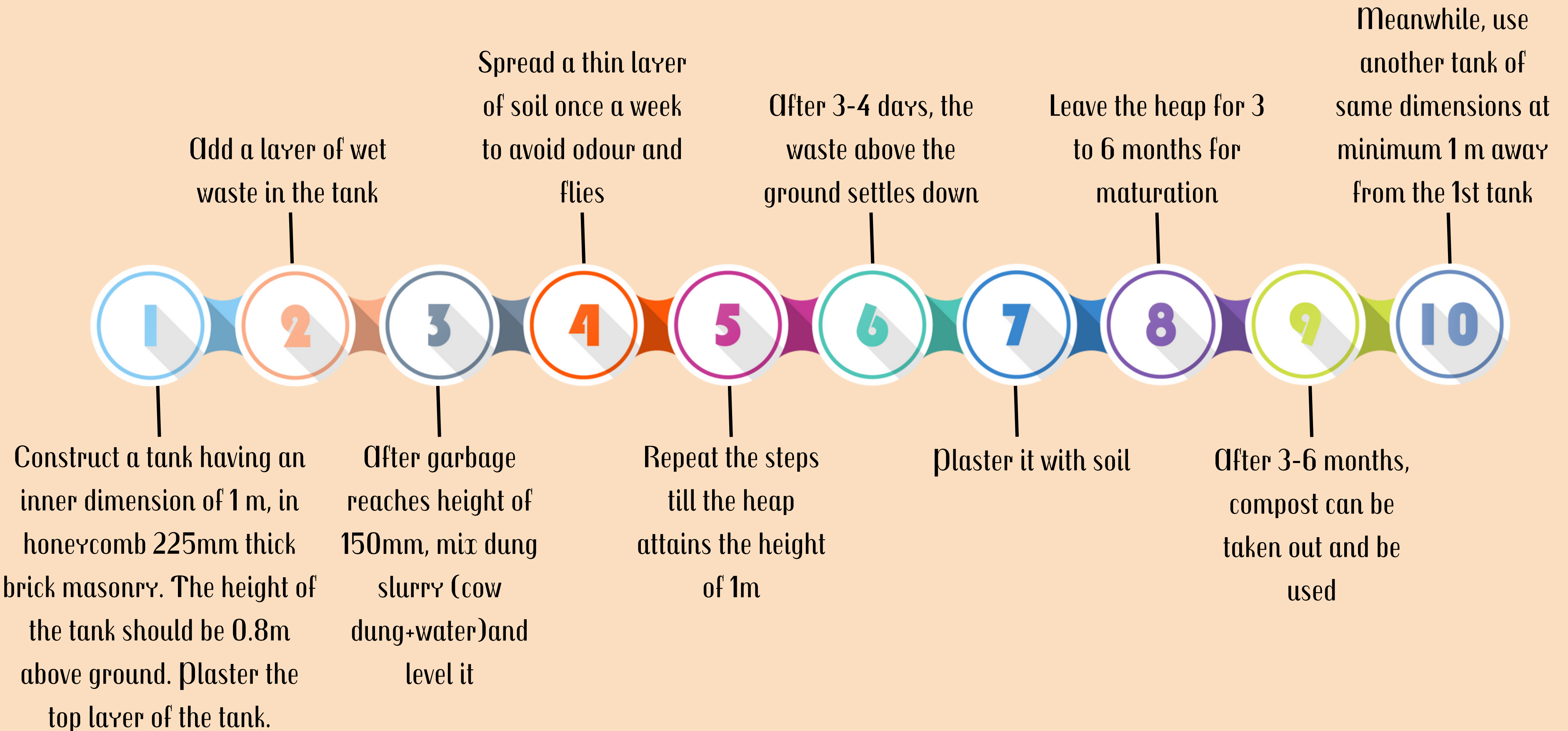


<https://www.flickr.com/photos/51923368@n05/15318803078>



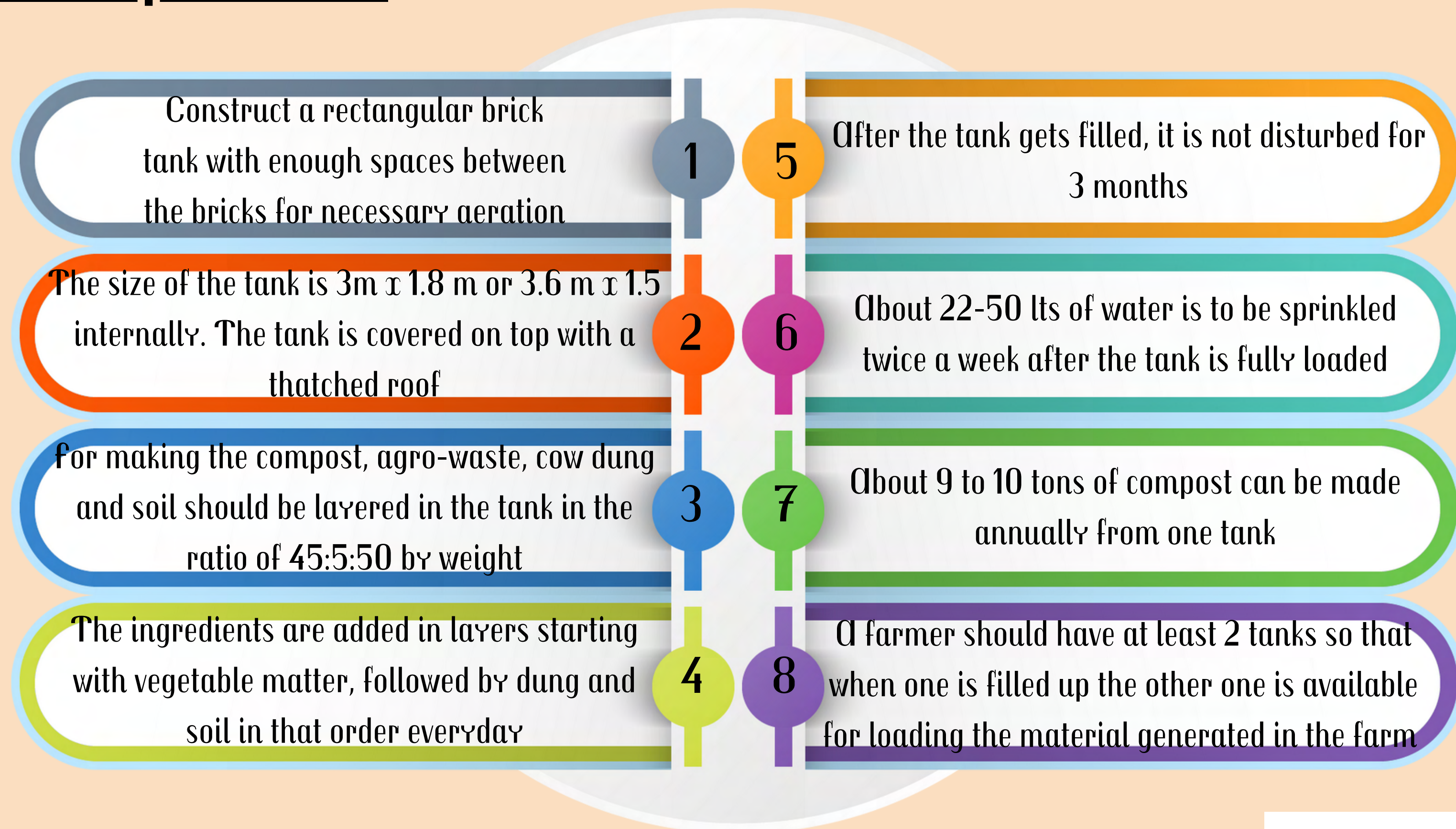


e. Overground brick-lined compost tank





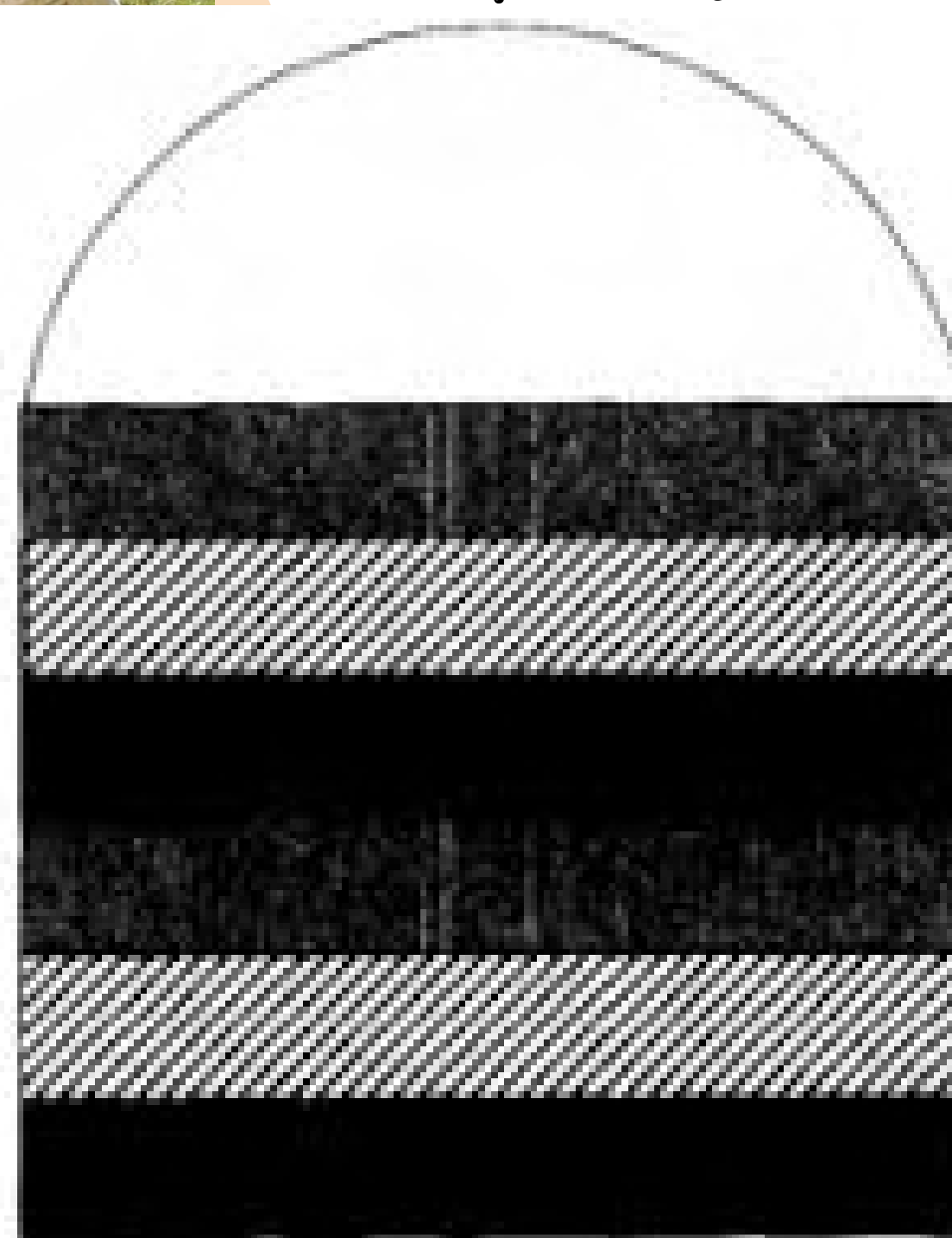
f. nadep method





https://ejalshakti.gov.in/misc/Docs/ProvenTech_S.pdf

<https://krishijagran.com/agripedia/how-to-prepare-nadep-compost/>



Third layer (soil)

Second layer (dung)

First layer (waste)

Third layer (soil)

Second layer (dung)

First layer (waste)

9. Indore method

Waste materials used: plant residues, animal waste, weeds, street refuse and organic waste

1

The waste is cut into small pieces and spread in layers of 10-15 cm thickness either in pits or in heaps

2

The pit is properly moistened with cow dung using earth

3

Ensure 50 % moisture: water should be sprinkled for making the composting materials moist.

4

Alternate layers of materials are stacked in the pit/ heap.
Periodically 3 -4 turnings are given.

5

The compost is ready in 4-5 weeks

6



<https://www.bitesizedgardening.co.uk/the-indore-composting-system/how-to-dig-for-victory/>

h. Vermi-composting

The vermicompost can be prepared in concrete tank or in soil pit lined with plastic sheet.

In household a cement ring can be used as pit for vermin composting.

The available bio-wastes should be collected and are to be heaped for pretreatment for 4-5 days

Sprinkling of cow dung slurry to the heap may be done.

A thin layer of half decomposed cow dung (1-2 inches) should be placed at the bottom of the pit.

Harvest the vermicompost by scrapping layer wise from the top of the tank and heap under shed. Sieving may also be done to separate the earthworms and cocoons.

Sprinkling of water should be done to maintain 70-80 % moisture content. and stopped when 90 % bio-wastes are decomposed

Place gunny bag on top of the cement ring to maintain moisture content of compost material.

Release about 2 kg earthworms per tonne of biomass or 100 nos. earthworms per one sq. ft. area.

Place the chopped weed biomass and partially decomposed cow dung layer wise (10-20 cm) in the tank / pot up to the depth of 2 ½ ft. The bio waste and cow dung ratio should be 60: 40 on dry wt. basis



https://www.researchgate.net/figure/Containers-for-vermicompost-production-models-used-in-8-districts-of-Andhra-Pradesh_fig3_262231444

i. Rotating drum composters

Add the greens and browns in the ideal C: N ratio. Rotate the drum once every day. The drum is rotated horizontally to stir the organic materials deposited in it for composting. Rotating the drum helps in mixing the contents and improves aeration. This speeds up the composting process and eliminates chances of foul smell.

<https://www.indiamart.com/proddetail/rotary-drum-composters-4883883991.html>



5. USES OF COMPOST

1. flower pots
2. Garden
3. Use as manure in fields



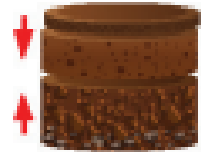
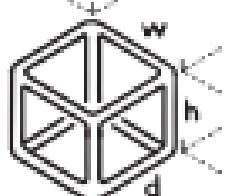
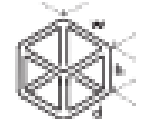
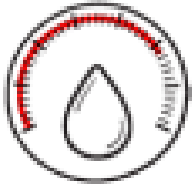
6. TROUBLESHOOTING COMPOSTING ISSUES

1. **Cold weather** can lead to the compost pile **drying** up, so **add water to moisten** the waste pile.
2. Optimum **C: N ratio (25:1 - 30:1)** is a **must** for proper growth and upkeep of microorganisms in the process.
3. **Wood should be avoided**, as it takes a lot more time to decompose.
4. **Lemons or Citrus fruits are to be avoided** as **they make the compost acidic** and may disturb the pH balance of the compost.



Source: Canva

TROUBLESHOOTING COMPOSTING ISSUES

PROBLEM	REASONS	TIPS
Pest or rodents attack 	Fresh food discards/meat discards in the compost 	Cover the fresh food discards/meat discards fed with semi-composted materials. Use pest repellents like neem oil, lemongrass oil, or camphor oil around composting sites or on the outer side of the composting equipment. Sprinkling turmeric powder around the composting equipment will prevent pests including ants.
Foul smell 	 Compression	Turn the compost pile or poke holes to aerate it.
	 Excess moisture	Add dry materials like dried leaves, rice husk, wood chips, etc to absorb extra moisture.
Ammonia smell 	 Too much nitrogen	Add more carbon-rich materials like dried leaves, wood chips, rice husk, saw dust, etc.
High temperature 	 Size too large	Spread the pile of organic discards to allow more aeration and cooling.
Low temperature 	 Size too small	Increase the quantity of discards to trap the heat within.
	 Dry	Sprinkle water to improve and maintain moisture level at 50%.
	No aeration	Turn the compost regularly to improve aeration.

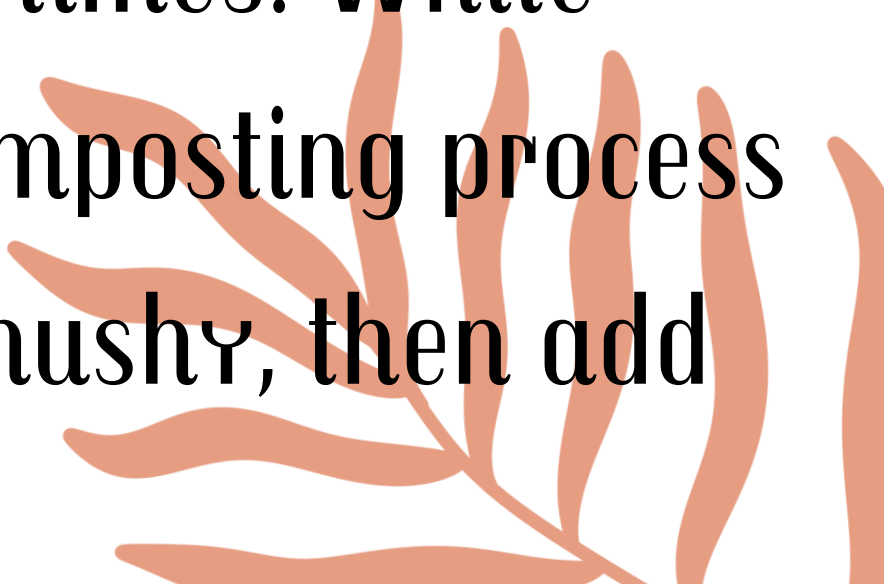
7. FAQ

1. Should I cut wet waste into small pieces and drain liquid from the waste?

Chopping organic waste into small pieces (i.e., 3-4 cms), increases surface area and speeds up the decomposition process while draining liquid from the waste ensures that the compost pile is not too wet.

2. What should be done if there's fungus on the compost pile?

A compost pile may have white, yellow, blue, or green fungus at times. White fungus is nothing to be worried about and is a sign that your composting process is working well. However, if your compost pile is smelly, slimy/mushy, then add browns to your compost and turn the pile well.



3. How should I avoid bad odour in the compost batch?

Compost batch typically odour bad due to anaerobic conditions. Keep in mind not to compress or push down contents of compost pile, which might result in limited air in the container. Turn the pile frequently. Also, it is important that appropriate C:N ratio is maintained while feeding organic waste into the container.

4. What should I do with fOM from my compost container?

Leachate (fOM) is full of nutrients but in a concentrated form. So, it must be diluted with water in a ratio of at least 1:3 (1 part leachate: 3 parts water) before it is used as manure for trees and plants.

REFERENCES:

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2. https://sbmurban.org/storage/app/media/pdf/sbm_knowledge_center/OWM_at_Home_A_Guidebook_English.pdf
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4. https://ejalshakti.gov.in/misc/Docs/ProvenTech_S.pdf