

## 1. What is compost?

Compost is natural manure made of organic remnants. In the process of composting microbes feed on the organic material and reproduce. Their activity generates heat that serves to deactivate pathogens (germs) and kill weed seeds. The finished compost can be used to improve soil fertility, and helps to save money by substituting artificial fertilizers.

## 2. Why compost human faeces?

Human faeces are rich in plant nutrients. Through composting, these nutrients become easier for plants to absorb and the material becomes more agreeable to handle. At the same time, composting sanitises the faeces and prevents the spread of germs and weeds.

## 3. Human faeces – how to compost?

Composting faeces requires the addition of materials that provide structure and balance the nutrients. A good structure allows air to circulate through the compost and lets the microbes breathe. Composting of undigested plant and animal residues together with faeces is termed co-composting.

## 4. The nutshell guideline

- *Collect faecal matter.* Faeces are best collected separately from urine. Urine can be used as liquid fertilizer and the odour nuisance of faecal matter is reduced. Examples of facilities that supply faecal matter (faeces plus paper, saw dust and other materials) are bucket toilets and simple and ventilated pit latrines (1).



Fig 1: Ventilated pit latrines at Orphanage Africa in Ayeniah, Ghana

- *Stock pile brown material.* Carbon-rich materials such as leaves, straw, twigs, branches, paper (avoid glossy prints), card board and wood are called brown materials. These

materials are the energy source for compost microbes. Chopped to pieces not thicker and longer than our fingers, brown materials provide structure to the compost.

- *Gather green materials.* Fresh leafy green plant material, food waste, peelings and rotten fruit are called green materials. They are easy to digest and a nitrogen source for microbes. Sufficient green material is important in order to achieve initial high microbial activity and elevated temperatures.

- *Compost set-up.* The raw materials are collected separately until enough for one big batch is available. A pile should not be smaller than 1 m<sup>3</sup> to keep the

generated heat inside. Brown materials, preferably dry, constitute the largest proportion, about 3 parts in volume. Green materials and faecal matter



Fig 2: Compost piles covered with palm fronds at Songhai Centre, Porto Novo, Benin

should be added at 1 part each. All materials must be mixed well. This can be easily achieved by adding the materials alternately to the pile and mixing during stacking. To keep the compost moist and warm, and to prevent it from getting soggy during heavy rain, permanent enclosures are used (3). Alternatively, compost piles can be covered with large leaves (2).

- *Turning.* By turning the compost inside out we make sure that all materials get exposed to the high temperatures in the centre. If the compost does not contain a sufficient amount of good quality structure material, turning improves aeration, too. The compost should be turned after the pile is set up, and again one week to 10 days later.

- *Moisture and temperature.* A dry compost pile will decompose slowly as all organisms need water for growth. If the pile is too wet, the air supply will be limited, and odour-causing anaerobic decomposition may occur. Compost should be about as moist as a wrung out sponge. Squeezing a handful of compost will give a good indication of its water content. In addition, the temperature inside the pile can be checked at the same time. Between the first and second turning, the inside of the pile should be too hot to keep our hand in the core for a prolonged time. High temperatures during the 2<sup>nd</sup> and 3<sup>rd</sup> week are usually sufficient to



Fig 3: Permanent compost enclosures at Valley View University in Oyibi, Ghana

deactivate most pathogens and kill seeds.

- *Resting.* After the second turning, the compost should rest to mature for at least 4 months. During this time, we keep the compost well covered and monitor only the moisture.

## 5. Troubleshooting

- *Compost develops bad odour.* Insufficient aeration and excessive wetness of the compost will lead to bad odour. Adding dry structure (brown) material and turning the compost will reduce moisture.
- *Compost is too dry.* Add water carefully. A watering can with a shower head facilitates even application.
- *Ammonia odour.* If the substrate contains too much nitrogen the compost will smell of ammonia. In this case integrate more brown material.
- *Pile does not heat up.* In a sufficiently large pile, an incorrect moisture level and/or insufficient nitrogen are the most likely reasons for low temperatures. Check and, if necessary, adjust the moisture level. If the moisture level is correct, add green material or urine.

## 6. Quality control

The hygienisation process during composting can be validated by the germination capacity of tomato seeds. Tomato seeds survive mesophilic temperatures of 25-40 °C and serve as an indicator of the persistence of pathogens and weed seeds. For validation, some seeds

are placed into the compost during the 2 weeks in which the highest temperatures are expected. If the seeds do not germinate within two weeks after their recovery, the compost can be assumed to be largely sanitised.



Fig 4: Mature compost has the pleasant smell of garden soil

## 7. Hygiene considerations

Human faeces contain infectious pathogens. Therefore, hand washing after handling of fresh faecal matter, faecal sludge and faecal compost is a necessity. Also, eating, drinking and smoking when working with these materials should be avoided. Basically, the same rules apply as when we use a public toilet – nothing more, nothing less.

Compost made with human faeces in accordance with the above method has been found to meet the current hygienic standards. However, to further increase hygienic safety, faecal co-compost generally should not be applied to vegetables and fruits eaten raw.

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*Small scale composting of human faeces...*



*...in a nutshell*