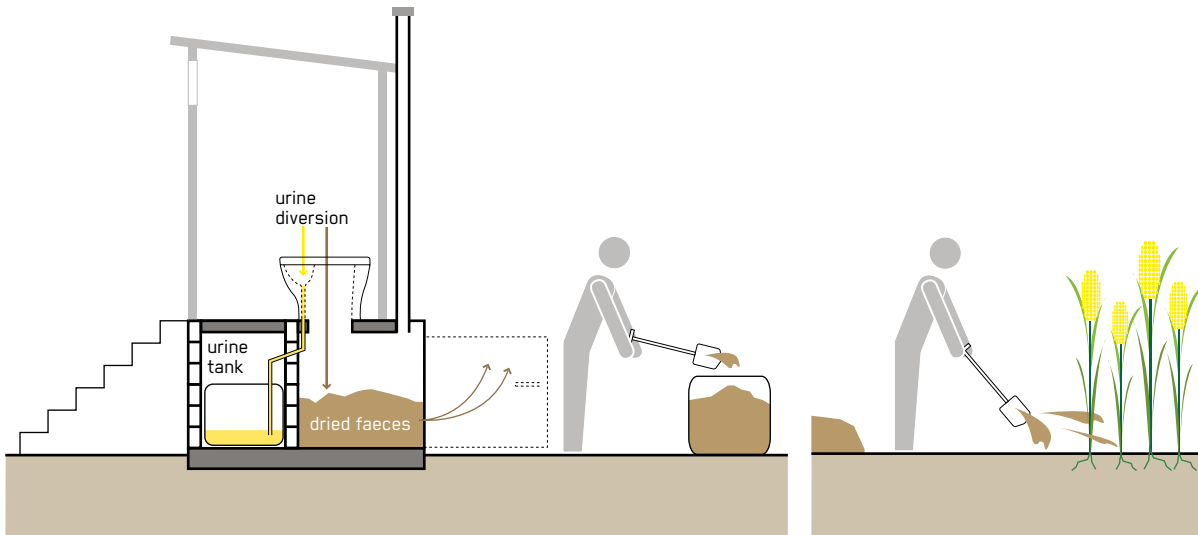


# Application of Dried Faeces

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response ★ Stabilisation ★★ Recovery	★★ Household ★ Neighbourhood City	★★ Household ★★ Shared ★ Public	Productive use of nutrients, Use as soil conditioner
Space Required	Technical Complexity	Inputs	Outputs
★★★ High	★ Low	● Dried Faeces	● Biomass



When faeces are stored in the absence of moisture (e.g. urine or anal cleansing water), they dehydrate into a coarse, crumbly, white-beige, material or powder and can be used as a soil conditioner.

Dehydration is very different from composting as the organic material is not degraded or transformed, only the moisture is removed through the addition of drying materials after defecation and proper ventilation and time. Through dehydration faeces can reduce in volume by about 75%. Completely dry faeces are a crumbly, powdery substance. The material is rich in carbon and nutrients, but can still contain worm eggs, protozoan cysts or oocysts (spores that can survive extreme environmental conditions and be re-animated under favourable conditions) and other pathogens. The degree of pathogen inactivation will depend on the temperature, the pH (using ash or lime raises the pH) and the storage time. It is generally recommended that faeces should be stored and

dehydrated for between 6 to 24 months, although pathogens can remain viable even after this time. See World Health Organization (WHO) Guidelines for the Safe Use of Wastewater, Excreta and Greywater for more specific guidance. The dehydrated faeces can be used as an additive in subsequent composting, mixed directly into the soil or buried elsewhere if reuse is not intended. Extended storage is also an option if there is no immediate use for the material.

**Design Considerations:** Faeces that are dried and kept at between 2 and 20 °C should be stored for 1.5 to 2 years before being used. At higher temperatures (> 20 °C average), storage over one year is recommended to inactivate helminths (e.g. *Ascaris* eggs). A shorter storage time of six months is required if the faeces have a pH above 9 (e.g. by adding ash or lime increases the pH). For further detail the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater should be consulted.

**Materials:** The Application of Dried Faeces requires wheelbarrows, shovels, spades, rakes, and personal protective equipment (PPE). For cultivating the land where dried faeces have been applied other gardening tools may be required. Dried faeces can be stored and transported in used containers or bags.

**Applicability:** The Application of Dried Faeces is usually not considered a priority in acute emergencies, but might be an option during the stabilisation and recovery phases provided it is acceptable to the local population, farmers and potential consumers of agricultural products. Dried faeces can help improve poor soils and boost its carbon and water-storing properties, while posing low risk of pathogen transmission. Dried faeces are less efficient as a soil amendment than composted faeces. The dehydration process works best in hot and dry climates.

**Operation and Maintenance:** When removing dehydrated faeces from dehydration vaults, care must be taken to avoid the powder being inhaled. Workers should wear PPE. Faeces should be kept as dry as possible. If water or urine enters and mixes with drying faeces, more drying material should be added to help absorb the moisture. Prevention is the best way to keep faeces dry.

**Health and Safety:** Dehydrated faeces are a hostile environment for organisms and most pathogens die off relatively quickly (usually within weeks). However, some pathogens (e.g. *Ascaris* eggs) may remain viable even after longer drying periods and therefore a secondary treatment like Co-Composting (T.11) or Vermicomposting (T.12) is recommended before dehydrated faeces are applied in agriculture. Dried faeces are usually incorporated into the soil prior to the planting season and the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater

with its flexible multi-barrier approach should be consulted for further guidance. PPE (e.g. gloves, masks and boots) should be used when removing, transporting and applying dried faeces.

**Costs:** Costs to consider include the potential transport cost from the toilet to the field and costs for labour, agricultural equipment and PPE. Application of dried faeces can contribute to revenue generation by increasing agricultural yields and to money savings if it replaces other fertilisers or soil conditioners.

**Social Considerations:** The handling and use of dried faeces may not be acceptable in some cultures and the potential Application of Dried Faeces needs be discussed with the affected communities. However, because dehydrated faeces should be dry, crumbly, and odour free, using them might be easier to accept than manure or sludge. Offensive odours may be generated if the level of dehydration is insufficient.

**Strengths and Weaknesses:**

- ⊕ Can improve the structure and water-holding capacity of the soil
- ⊕ Low risk of pathogen transmission
- ⊖ Labour intensive
- ⊖ Pathogens may exist in a dormant stage (cysts and oocysts) which may become infectious if moisture is added
- ⊖ Contains only limited amount of nutrients
- ⊖ Social acceptance may be low in some areas

→ **References and further reading material for this technology can be found on page 195**