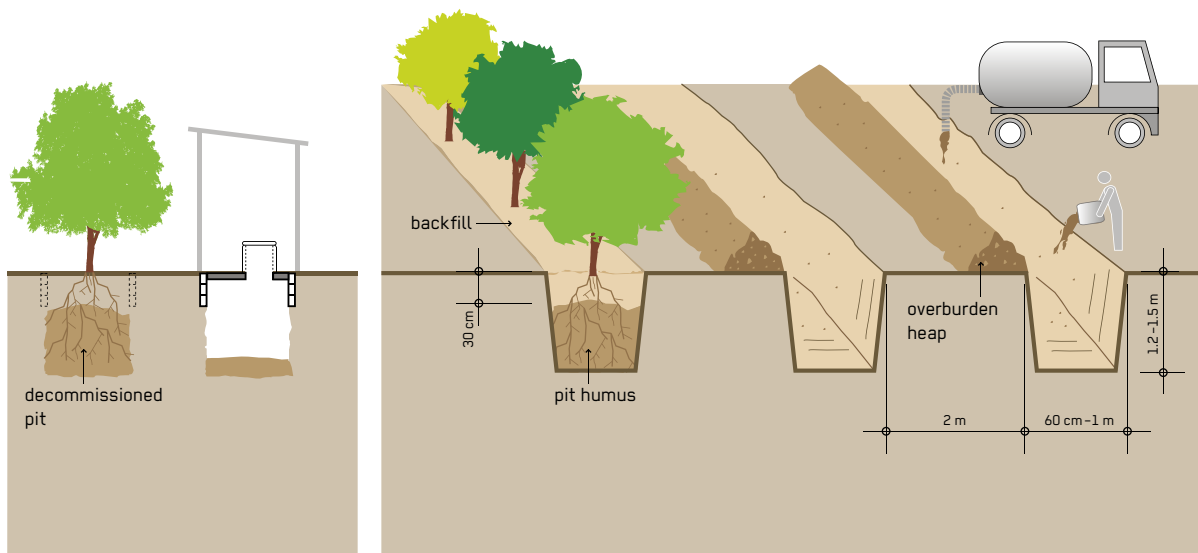


Fill and Cover: Arborloo and Deep Row Entrenchment

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, Safe disposal
Space Required	Technical Complexity	Inputs	Outputs
** Medium	* Low	● Excreta, ● Organics), (● + Anal Cleansing Water), (● + Dry Cleansing Materials)	(● Biomass)



To decommission a pit or trench, it can be topped up with soil and covered. Similarly, untreated (faecal) sludge and excreta can be disposed of in a Deep Row Entrenchment. The covered full pit or trench poses no immediate health risk and the contents will degrade naturally over time. Trees can be planted on top of the nutrient-rich pits and trenches and will grow vigorously.

When pits (S.3, S.4) or trenches (S.1) are full "Fill and Cover", i.e. filling the remainder of the pit and covering it, is an option. The Arborloo is a shallow pit designed specifically on this principal, with a tree being planted in the pit once it is full, and the superstructure, ring beam and slab moved to a new shallow pit. Before an Arborloo pit is first used, a layer of leaves is put on the bottom of the empty pit. A cup of soil, ash or a mixture of the two should be added to the pit to cover excreta after each defecation. If available, leaves can be occasionally added to improve the porosity and air content of the pile. When the pit is full

(usually every 6 to 12 months), the top 15 cm is filled with soil and a tree is planted. Banana, papaya and guava trees (among many others) have proven to be successful. Deep Row Entrenchment is a method that can be considered as both a treatment and disposal option. It consists of digging deep trenches, filling them with sludge and covering them with soil. As with the Arborloo, trees can be planted on top, which benefit from the organic matter and nutrients that are slowly released from the sludge.

Design Considerations: An Arborloo is an option if the site is suitable for a tree to grow with enough available space. A shallow pit, about 1 m deep, is needed for an Arborloo. A tree should not be planted, however, directly in the raw excreta. It should be planted in the soil on top of the pit, allowing its roots to penetrate the pit contents as it grows. It may be best to wait for the rainy season before planting if water is scarce. Deep Row Entrenchment is usually constructed with a backhoe. Dimensions are typically 1.2–1.5 m

deep, about 0.6–1 m wide and with a length of several meters, depending of the space available. Space between rows can be 2 m or more edge-to-edge. The depth of the trench is determined by the volume of sludge to be applied. The trench is filled with sludge to within 0.3 m of the surface and then backfilled with the overburden heaped. Trees or other vegetation are planted on or between trenches. Variables to consider are trench dimensions, spacing, method of filling (layered with soil or co-composted with vegetable matter), species, composition and density of vegetation and end purpose.

Materials: Tools are needed to dig the pit hole, and a backhoe is useful in the case of Deep Row Entrenchment. Small trees should be available for transplanting.

Applicability: Fill and Cover is an adequate solution when emptying is not possible or where there is space to continuously dig new pits. The Arborloo can be applied in rural, peri-urban, and even denser areas if enough space is available. Planting a tree in the abandoned pit is a good way to reforest an area, provide a sustainable source of fresh fruit and prevent people from falling into old pit sites. The same principle can be applied to trench latrines. Depending on the local conditions, however, the content of a covered pit or trench could contaminate groundwater resources until it is entirely decomposed. Deep Row Entrenchment can be considered where there is land available with adequate size and no groundwater contamination risk. These options can be applied in all phases of emergency, as soon as a pit or trench is full.

Operation and Maintenance: For the Arborloo a cup of soil and/or ash should be added to the pit after each defecation and leaves should be periodically added. Ideally, the contents of the pit should be periodically levelled with a stick to prevent a cone shape from forming in the middle. Once the pit is full, the latrine superstructure needs to be moved to a new pit. There is little maintenance associated with a closed pit or trench other than taking care of the tree or plant. Trees planted in filled pits and trenches should be regularly watered. Small fences should be constructed around saplings to protect them from animals.

Health and Safety: There is minimal risk of infection if the filled pit or trench is properly covered and clearly marked. It may be preferable to cover a pit and to plant a tree rather than emptying it, especially if there is no appropriate technology available to remove and treat the faecal sludge and space is no constraint. Users do not come in contact with the faecal material and, thus, there is a very low risk of pathogen transmission. As for Deep Row Entrenchment, personal protective equipment is required during sludge collection and disposal into the trench.

Costs: Fill and Cover is a low-cost solution. The main cost items are tools, machinery and staff needed to dig the pits or trenches. Trees and edible crops can generate income or reduce food expenses.

Social Considerations: Arborloo and Deep Row Entrenchment are simple and do not produce visible or olfactory nuisance, except during sludge transport for the latter. They also reduce the risk of exposure to pathogens after covering. Arborloo demonstration projects that allow for the participation of community members are useful to display the ease of the system, its inoffensive nature, and the nutrient value of human excreta.

Strengths and Weaknesses:

- ⊕ Technique is simple to apply for all users
- ⊕ Low cost
- ⊕ Low risk of pathogen transmission
- ⊕ May encourage income generation (tree planting and fruit production)

- ⊖ New pit must be dug; the old pit cannot be re-used
- ⊖ Covering a pit or planting a tree does not eliminate the risk of groundwater contamination
- ⊖ Space required

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