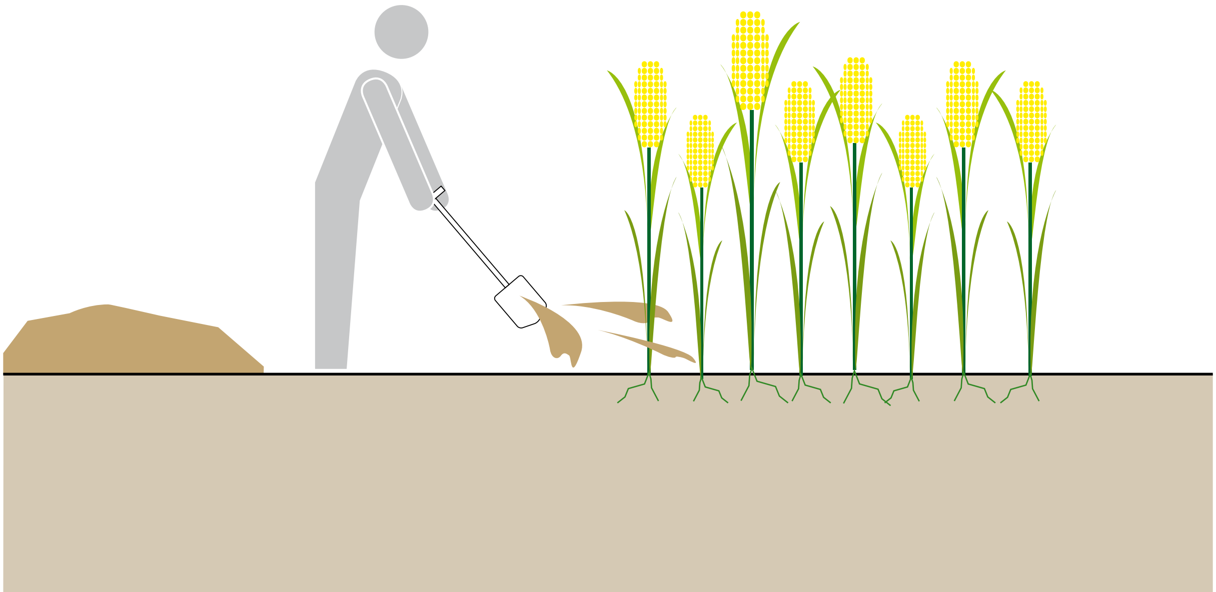
D.4 Application of Pit Humus and Compost

Applicable to:
Systems 2, 3

Application Level:	**Management Level:**	**Inputs:** Pit Humus, Compost
★★ Household	★★ Household	**Outputs:** Biomass
★★ Neighbourhood	★★ Shared	
★ City	★ Public	



Compost is the soil-like substance resulting from the controlled aerobic degradation of organics. Pit humus is the term used to describe the material removed from a double pit technology (S.4, S.5 or S.6) because it is produced passively underground and has a slightly different composition than compost. Both products can be used as soil conditioners.

The process of thermophilic composting generates heat (50 to 80 °C) which kills the majority of pathogens present. The composting process requires adequate carbon, nitrogen, moisture, and air.

The Double VIP (S.4), Fossa Alterna (S.5) or Twin Pits for Pour Flush (S.6) are ambient-temperature variations of high-temperature composting. In these technologies, there is almost no increase in temperature because the conditions in the pit (oxygen, moisture, C:N ratio) are not optimized for composting processes to take place. Because of this, the material is not actually 'compost' and is, therefore, referred to as 'pit humus'. The texture and quality of the pit humus depends on the materials which have been added to the excreta (e.g., soil added to a Fossa Alterna) and the storage conditions.

WHO guidelines on excreta use in agriculture stipulate that compost should achieve and maintain a temperature of 50 °C for at least one week before it is considered safe to use. Achieving this value, however, requires a significantly longer period of composting. For technologies that generate pit humus, a minimum of 1 year of storage is recommended to eliminate bacterial pathogens and reduce viruses and parasitic protozoa. WHO guidelines should be consulted for detailed information.

Design Considerations It has been shown that the productivity of poor soil can be improved by applying equal parts compost and top soil to it. The output from one Fossa Alterna should be sufficient for two 1.5 m by 3.5 m beds.

Appropriateness Compost and pit humus can be beneficially used to improve the quality of soil. They add nutrients and organics and improve the soil's ability to store air and water. They can be mixed into the soil before crops are planted, used to start seedlings or indoor plants, or simply mixed into an existing compost pile for further treatment.

Vegetable gardens filled with pit humus from the Fossa Alterna have shown dramatic improvements over gardens planted without soil conditioner. The use of pit humus has even made agriculture possible in areas which otherwise would not have supported crops.

Health Aspects/Acceptance A small risk of pathogen transmission exists, but, if in doubt, any material removed from the pit or vault can be further composted in a regular compost heap before being used or mixed with additional soil and put into a 'tree pit', i.e., a nutrient-filled pit used for planting a tree. Compost and pit humus should not be applied to crops less than one month before they are harvested. This waiting period is especially important for crops that are consumed raw.
As opposed to sludge, which can originate from a variety of domestic, chemical and industrial sources, compost and pit humus have very few chemical inputs. The only chemical sources that could contaminate compost or pit humus might originate from contaminated organic material (e.g., pesticides) or from chemicals that are excreted by humans (e.g., pharmaceutical residues). Compared to the chemicals that may find their way into wastewater sludge, compost and pit humus can be considered as less contaminated.
Compost and pit humus are inoffensive, earth-like products. Regardless, people might refrain from handling and using them. Conducting demonstration activities that promote hands-on experience can effectively show their non-offensive nature and their beneficial use.

Operation & Maintenance The material must be allowed to adequately mature before being removed from the system. Then, it can be used without further treatment. Workers should wear appropriate protective clothing.

Pros & Cons

+ Can improve the structure and water-holding capacity of soil and reduce the use of chemical fertilizers
+ May encourage income generation (improved yield and productivity of plants)
+ Low risk of pathogen transmission
+ Low costs

- May require a year or more of maturation
- Social acceptance may be low in some areas

References & Further Reading

- Del Porto, D. and Steinfeld, C. (1999). *The Composting Toilet System Book. A Practical Guide to Choosing, Planning and Maintaining Composting Toilet Systems, an Alternative to Sewer and Septic Systems.* The Center for Ecological Pollution Prevention (CEPP), Concord, MA, US.

- Jenkins, J. (2005). The Humanure Handbook. *A Guide to Composting Human Manure.* 3rd Ed. Jenkins Publishing, Grove City, PA, US.

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(Detailed book compiling the current state of knowledge on all aspects related to FSM)

- WHO (2006). *Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Volume 4: Excreta and Greywater Use in Agriculture.* World Health Organization, Geneva, CH.
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