

Waterless composting toilets

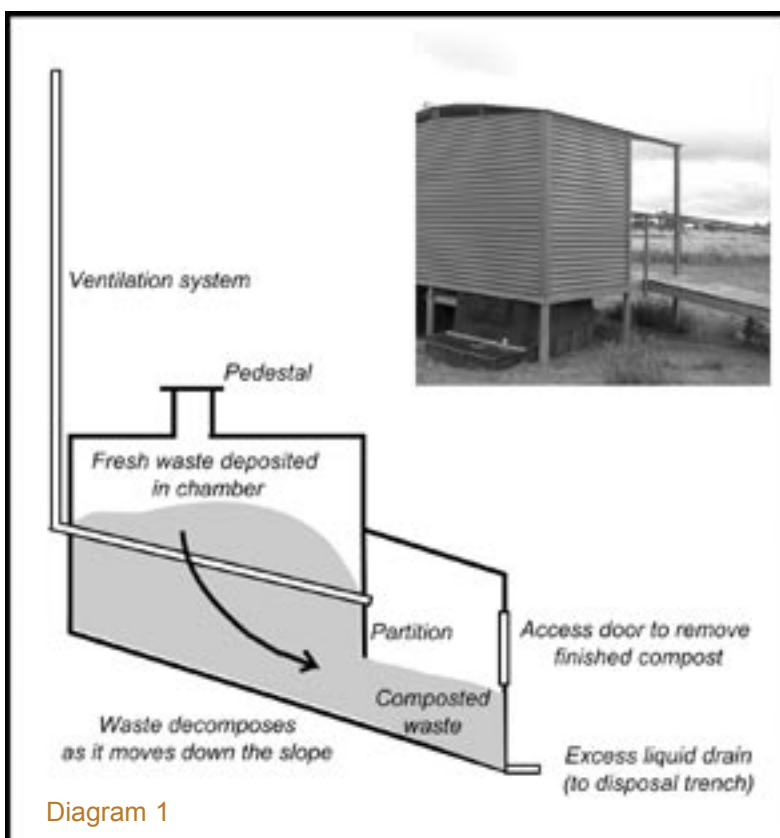


Diagram 1
Cross section of a continuous-process composting toilet chamber and (inset) a prefabricated continuous-process toilet.

BUSH TECH #15 *Choosing the right toilet* introduced four types of toilets and talked about the features, advantages and disadvantages of each. This BUSH TECH has more detail about composting toilets. This is about waterless composting toilets: that is composting toilets that don't mix any water with the waste. There are designs for composting toilets that do use water. They are not very common and are not discussed here.

What is a composting toilet?

A composting toilet is a waterless (non-flushing) toilet that converts human waste (faeces and urine) into a soil-like product, through a process of aerobic decomposition, or composting. It works in the same way as a garden compost bin. Basically, the waste is kept in a composting chamber where naturally occurring microorganisms (bacteria, fungi and others) convert the waste into compost. The composting process reduces the volume of the waste, and kills most harmful and disease-causing organisms. Waste usually remains in the composting chamber for a year or more, and then is removed.

The finished compost does not look or smell like human waste. It looks and smells like rich, organic soil, and is a very good fertilizer for gardens. Although the finished compost should not contain any harmful organisms, it does need to be handled with some care. It is usual practice to bury it rather than leave it on the soil surface, and this is a legal requirement in some states. Burying it in an orchard is ideal.

There are regulations about where composting toilets can be used and how they must be designed. These laws are different in each State and Territory, and some local governments also have their own laws. CAT staff in Alice Springs, Derby and Cairns can help you choose a composting toilet design that meets the legal requirements in your area.

Design features

Basically, a composting toilet is a toilet pedestal sitting above a composting chamber. Toilet waste drops onto a waste pile in the chamber where it slowly composts. The composting chamber is usually above the ground so that it can get enough ventilation and can be drained. The size of the composting chamber is designed to suit the number of people who will be using the toilet. A composting toilet can be built into a house, or can be built as a separate building. However, it is difficult to put a composting toilet into a low-set or slab-on-ground house because of the need to put the composting chamber under the floor.

Composting is an aerobic process: it needs lots of air to work properly. So, good ventilation of the composting chambers is very important. Most designs have a screened opening in the composting chamber, and a vent pipe. Some designs have an electric fan to draw air through the chamber and up the vent pipe. Other designs rely on natural wind and air movement to draw air through the chamber and the vent pipe.

For good composting, the waste in the chamber needs to be moist but not wet. Most composting toilets are designed so that excess liquid drains out of the waste pile into an absorption trench dug into the ground at a suitable location near the toilet. There are a few designs that rely on evaporation to dispose of excess liquid.

The speed at which composting occurs also is affected by temperature. In cold climates, composting toilet chambers are sometimes heated. This is not required anywhere in northern Australia.

There are two basic types of waterless composting toilets: batch process toilets and continuous process toilets. A continuous process toilet has only one composting chamber. Fresh waste is added to one part of the chamber, and finished compost is removed from a different part of the chamber. The chamber is designed so that only fully composted waste is removed. Diagram 1 (above) is a sketch of a typical continuous process composting toilet.

Waterless composting toilets (continued)



A batch process toilet has more than one chamber and the chambers are filled with waste one at a time. Once a chamber is full, another chamber is brought into use. With some designs, you move the full chamber out from under the pedestal and put an empty one in. With other designs, the chambers stay where they are and it is the pedestal that is moved. Either way, the first chamber is left to compost then, when the compost is finished, it can be emptied and used again. Diagram 2 shows a typical batch process composting toilet, where the pedestal is moved from one chamber to the other.

When to build a composting toilet

A composting toilet is a good option where soil conditions are not suitable for a pit toilet; e.g. if there is a high water table, or impermeable rock at shallow depth. Composting toilets release much less pollution into the environment than either pit toilets or septic tanks, so they are a good option for environmentally sensitive areas. They don't need a reliable water supply for flushing (although of course it is essential to have water available for people to wash their hands after using the toilet). Composting toilets do not get blocked the way that flush toilets do. As with pit toilets, composting toilets only deal with toilet waste. You will need another wastewater disposal system for wastewater from the bathroom, kitchen and laundry.

How to manage a composting toilet

Composting toilets need a lot more management and care than pit toilets. Most designs require dry, loose material such as leaves, sawdust or shredded paper to be added to the compost pile regularly, to keep the compost balanced. This is called bulking material. You may need to rake the material in the composting chamber so that the chamber fills evenly. If people put things down the toilet that won't compost (such as disposable nappies or plastic rubbish), the toilet will fill up faster, and the waste may not compost as well. Toxic chemicals such as bleach and some solvents can stop the composting process by killing the microorganisms that do the work. Of course you also need someone to empty out the finished compost from time to time.

Choosing a composting toilet design

There are a number of different designs around for composting toilets. There are several manufacturers in Australia making toilets that can be bought as pre-fabricated systems, and there are other designs that can be built on-site from plans. There are a few things to think about when choosing a design.

- **Fans** - Most of the prefabricated toilet systems use electric fans to ventilate the chambers. That means you need continuous electricity supply. Also, if the fan breaks down, ventilation is reduced. That means the toilet may smell, and the composting process doesn't go as well. Ask the supplier how long the fans usually last. Check that it is easy to change the fan over and keep spare fans handy.

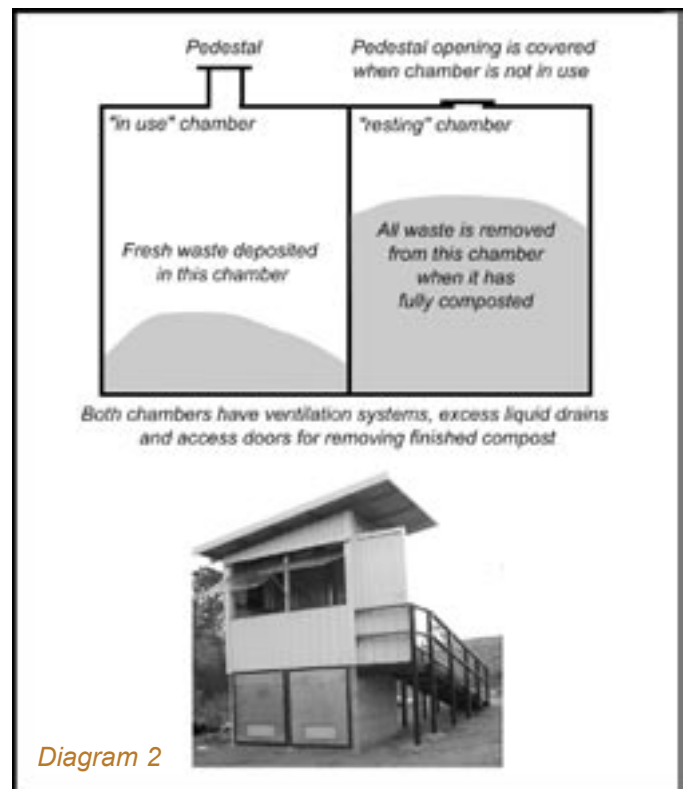


Diagram 2
Cross-section of the composting chambers of a batch-process composting toilet (above) and prototype of the CAT-designed batch-process toilet (below).

- **Batch versus continuous** - With a continuous process toilet, if something goes wrong (such as the toilet getting filled up with rubbish, or someone pouring in a chemical that stops the composting), then you need to empty out the chamber and start again. That means handling un-composted waste, which is a serious health hazard. With a batch toilet, if there is a problem with the chamber that is in use, you can simply change over to another chamber. For this reason, we think that batch toilets are more suitable for remote Indigenous communities.

- **Chamber size** - Small chambers are less reliable than big ones. A bigger chamber allows more air movement which improves ventilation, and allows for higher usage when there are extra visitors staying. There is more room to spare if people put rubbish down the toilet which won't compost, and, if the composting process slows down for some reason, it is less likely that the toilet will fill up.

CAT has designed a batch process composting toilet that is suitable for small outstations or communities with just one or two houses. It is designed to be built on-site by a community building crew, from readily available building materials. It does not use an electric fan for ventilation and has large chambers. For more about this toilet see article in *Our Place #20*, or for a copy of the plans call CAT Cairns on 07 4031 0505.

For a copy of *BUSH TECH #15 Choosing the right toilet* or *Our Place #20*, please telephone on 08 8951 4311.

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