# Urine-diverting dry toilets

Low-tech with Refugees - Low-tech & Réfugiés




https://wiki.lowtechlab.org/wiki/Toilettes_s%C3%A8ches_%C3%A0_s%C3%A9paration_d%27urine/en

Dernière modification le 06/08/2024

Difficulté **Moyen**

Durée **5 jour(s)**

Coût **400 EUR (€)**

## Description

*Eternal" urine-separating dry toilets, designed to compost dry matter directly under the toilet to avoid emptying. There are two main tools for achieving this: air circulation and vermicomposting.*

# Sommaire

## Sommaire

# Introduction

This prototype is the fruit of a generous collaboration between Pierre Colombot, founder of Sanisphère, the association Low-Tech & Réfugiés and the association De Terreau et d'Embruns, which has been awarded the Low-Tech Explorer label and is the creator of this prototype.

The main features of this prototype are: the use of a recovery tarpaulin (such as a lorry or swimming pool) as a basic resource in addition to the wooden framework; urine/faeces separation; treatment of materials directly in situ by ventilation and vermicomposting of dry materials, as well as drainage of urine.

This model of urine-diverting dry toilet is designed to be adaptable to different user contexts, but its main constraint is that it needs to be installed outdoors, preferably on soil, in order to benefit from the advantages of natural ventilation and composting of faecal matter "in situ". Various options are available to best meet the needs of each context. Another major constraint is the social acceptance of urine separators, which are unknown to many people.
Note that this prototype is a summary of what we have learned and combines ideas that we found interesting. However, we are waiting for long-term feedback before we can confirm that it works 100% as intended.

Why urine-diverting dry toilets?

It goes without saying that, given the current climate issues, and in particular the increasing scarcity of drinking water, dry toilets are an obvious choice when it comes to sanitation. On average, a conventional toilet flush consumes **9 litres** of drinking water each time it is used. An adult goes to the toilet approximately 4 times a day. That's equivalent to **13,000 litres** of drinking water pollution per person per year. So we urgently need to rethink our habits, right down to the *smallest corner*.
What's more, in certain extreme contexts such as refugee camps (for which this prototype is potentially intended), water represents an even more precious resource that deserves to be safeguarded for other uses (hydration, nutrition and hygiene).

*Conventional" dry toilets (without separation, known as "biolitter") are highly functional and extremely simple to design, provided you have an outdoor composting area and dry materials such as sawdust/ash or litter, added to the faeces to reduce the strong odours resulting from the urine-faeces mixture. The main disadvantage is that the faeces container has to be emptied on a regular basis, otherwise it will become heavy, have strong odours and attract flies. This makes their collective use rather cumbersome in terms of management/maintenance. They are still very practical for domestic/family use.*

Urine-diverting dry toilets (or UDDTs) have the advantage of a lower operating odour, resulting in greater user acceptance, a reduced risk of fly proliferation and a reduction in pathogens through drying.
What's more, the significantly reduced weight of the receptacles is an advantage in terms of management and maintenance.
Lastly, separation facilitates the use of excreta in agriculture, since urine is sterile and does not need to be composted to be used as fertiliser. The use of urine as a natural fertiliser requires certain precautions, however, and may be open to debate. (add discussion Raph).

Separation technology:
As far as the user/receptacle interface (the seat itself) is concerned, different hardware options are possible depending on budget, available resources and cultural context (in particular cleaning habits, with paper or water).
From the simple funnel fixed in front of the hole to prefabricated objects with triple urine/faeces/rinse water separation, the range is vast. Our model is adaptable to these different technologies. Note that the most basic technology (i.e. the one closest to the low-tech spirit) - the funnel - does not really respect the female anatomy and causes urine to leak into the part intended for dry matter.
Finally, it should be noted that this type of dry toilet requires a high level of awareness among the public who are going to use them, to ensure that they are used correctly.
The risk of errors, and therefore of malfunctioning toilets, linked to their originality, is their biggest weakness. In contexts where human pressure is high, such as refugee camps, this could represent a real problem.

The "eternal toilet", or the wager of the earthworms!

As well as separating urine from faeces, our prototype is designed to compost dry matter directly under the toilet cubicle. This avoids the time-consuming task of emptying the toilet. The challenge, of course, is to calibrate the size of the storage space according to the frequency of toilet use, so that the growth rate of the pile of dry matter (faeces + toilet paper) does not exceed its composting rate. (add the faeces reduction equation by Pierre).
Composting is made possible by a number of factors:
- the presence of earthworms, deposited when the toilet is put into service. Their coprophagous activity will of course be supported by a variety of other small living organisms naturally present in the soil. Direct contact with the soil is therefore very important.
- effective ventilation of the storage area, made possible by the strictest possible air-tightness, with a single low-level air intake via the toilet seat and a high-level air outlet via a chimney.
- optimum humidity see Pierre discussion.

The risk of overflowing and the quality of composting will require regular checks by a supervisor in the first few weeks after installation. Once the composting parameters have been mastered, maintenance will consist of frequent cleaning of the user area, as with all toilet cubicles.

Urine elimination:

This prototype features two interchangeable urine systems.
Urine is discharged through a pipe connected to the urine separator. To avoid the work involved in manually removing a container of urine, the pipe is sunk directly into the ground and releases the urine into the soil, through a sand/gravel/stone drain that will have been dug when the structure was founded. But this system, although advantageous in terms of maintenance, is not entirely satisfactory, for two reasons.
On the one hand, we can't clearly identify whether the drain will be sufficient to prevent pollution of the soil and surrounding groundwater.
On the other hand, it's a real shame to write off the fertilising potential of 'liquid gold' in the garden.
We therefore offer the option of connecting the urine evacuation pipe to a jerrycan (or other container of your choice) so that this possibility can be offered to users without being obligatory or definitive.

Note of intent:
Many parameters need to be optimised or even modified to achieve the 'Holy Grail' of eternal toilets! We hope that this prototype will be enriched by everyone's experiments and advice. Thank you for your comments and constructive criticism.
A detailed version of this tutorial will be available just below in the "files" tab.

# Étape 1 -

# Notes et références

Eautarcie - Composting human waste -> Information on composting human waste.
Urine-diverting dry toilet - Wikipedia (wikipedia.org) -> Benefits and features of UDDTs
Use rainwater to flush your toilet - Smart Planete (planetehealthy.com) -> Regarding the figures on drinking water used in conventional toilets.
[https://blog.defi-ecologique.com/urine-agriculture/