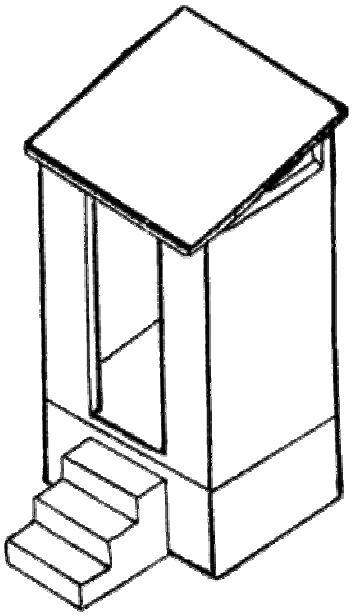
The Ecological Dry Composting Toilet System

Urgent Need... Effective Solution



Why build a dry composting toilet system instead of a flush-type, water-based toilet system?

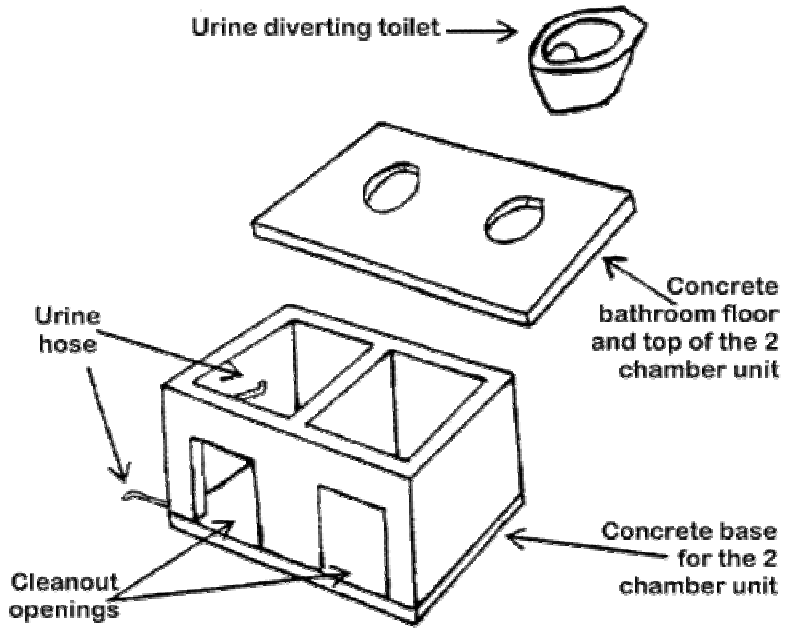
- Over one-third of the water consumed in an average household is used for the water-based toilet.
- In one year a family of five who uses a water-based toilet, contaminates almost 40,000 gallons (138,700 liters) of water.
- One family's dry composting toilet system can transform excrement into approximately 1,100 pounds of natural, dry fertilizer annually?

One of the most basic characteristics of any human community is how it deals with its body “wastes”. In the more developed countries, there are complicated and expensive systems for removing these wastes from houses and cities. This usually means treating the waste to one degree or another, then dumping it into sub-soils or bodies of water. While this avoids most of the problems of contagious disease which can be spread by contact with human waste, it hastens the loss of soil nutrients from farmland and it carries the risk of contaminating surface and ground water. In contrast, traditional peoples and societies with lower levels of energy and resources available to them have usually disposed of body waste by returning it to farm and garden soil. While these practices are more ecologically sound because they close the nutrient cycle from field to table and back again, they have often been linked with high levels of bacterial, viral and parasitic infection and mortality. Historic advances in public health were associated with the

installation of underground sewer systems in European and North American cities. This means public officials in those countries remain heavily invested in technologies of disposal, extending the mentality of "out of sight, out of mind." The septic tank and leach field system has become the disposal method of choice in rural areas.

Functioning of the Dry Composting Toilet System

The way the dry composting toilet system works is very simple.



A two chamber unit is built with one urine diverting toilet stool on top of the opening of the chamber that is to be put to use first. This chamber will be the active one. In the active vault, a pile of organic matter builds up, to which wood ash or lime mixed with sifted soil is added to maintain high alkalinity as well as to keep the fecal material dry and covered. When this first chamber is filled, the opening is covered and the urine diverting toilet stool is transferred to the other vault. The second chamber is now active while the first is passive or maturing. When the second chamber fills up, dry organic fertilizer can be harvested from the first. The fertilizer has a sandy appearance which is a poor reminder of its origin and is perfectly odor-free. Urine from the diverting toilet passes through a hose where it is drained off to an absorption well and absorbed into the soil or saved in a container and after three weeks time can be safely mixed with ten parts water and spread on a field as urea. The cycle, just summarized, takes between one and one-half to two years, depending on the number of users.

Construction Notes:

- This system can be built inside an existing home or outside in a separate structure.
- Build the two-chamber unit 1.70 meters wide by 1.30 meters deep and 80 centimeters high.
- The interior and exterior walls of each chamber must be plastered to prevent moisture from seeping into the chamber. This should be done prior to pouring the concrete slab that is supported by the chamber walls.
- The top of the two chamber unit is the floor of the bathroom. This concrete slab is reinforced with Re-Bar.
- Two metal or plastic molds are needed to form the two holes in the concrete over which the stool will sit. The molds are one half centimeter smaller than the inside measurement of the bottom of the toilet.
- The molds are removed once the concrete floor is poured. The toilet is placed on the floor above one of the two holes. The toilet is sealed to the floor with a mix of lime, sand and water so that it remains temporarily fixed to the floor, yet will be easy to remove when it is time to move the toilet over to the other chamber. Do not use cement to seal the toilet to the floor.
- Use brick or block with the lime mix to seal the chamber openings (cleanout doors) for the vaults to be easily opened and resealed.
- It is very important that the urine hose does not cross through the middle of the opening used for the excrement.
- The route of the hose must be sloped all the way to the absorption well with no sharp turns. This will prevent the urine from being stored in the hose and producing bad odors.
- The housing unit for the bathroom can be built out of any kind of material available (wood, bamboo, concrete block, etc.). The roof can be made of whatever local materials are available: roofing tiles, palm thatch, straw, metal or cardboard roofing material, etc. The steps and the cleanout openings can go where it is most convenient.
- If piped water is available, a sink with running water can be installed outside the toilet structure.

Use and Maintenance

Before using this toilet system, a quantity of mix including ¼ part ash or lime mixed with ¾ part soil (not sand) should be prepared. The soil and ash must be dry and sifted through a screen with holes slightly larger than window screen wire. This mix must remain dry and be available at all times.

Prior to sealing the cleanout opening of the chamber, first place a 5 cm . deep layer of the ash & soil mix on the floor of the chamber. This is done to absorb moisture from the first fecal matter deposited and to keep it from sticking to the floor of the chamber. The cleanout opening can then be bricked up and sealed so the system is ready for use.

The cleanout door can simply be brick or block, sealed with a mixture of lime, sand and water (without cement). In this way it will be easy to remove and rebuilt when empting dry fertilizer from the chamber.

After each defecation, 1 to 2 cups of the mixture of ash & soil is used to cover the fecal matter. When the mix is poured into the large back opening make sure none falls into the front section that is only for urine. A container of the mix should always sit beside the toilet. A large cup or can should be available to dip out the ash & soil mix.

Toilet paper should not be thrown into the chamber with the fecal matter. A waste basket should sit beside the toilet for disposal of toilet paper. Later the toilet paper should be burn.

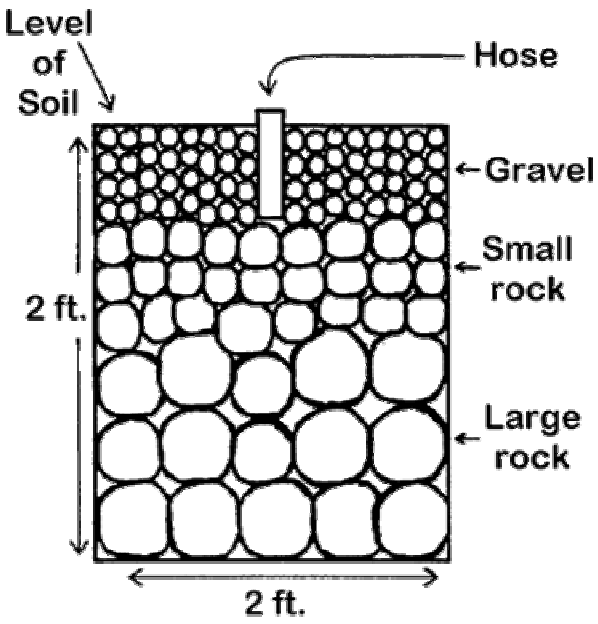
It is necessary to stir the fecal matter with a long stick every 3 to 6 days depending on the number of people using the toilet. This needs to be done so the fecal material and ash & soil mixture are spread evenly throughout the chamber, including corners; avoiding a build up of a mountain of waste. After stirring the fecal matter, it is necessary to pour on a layer of the mixture of ash & soil. A stick, 6 foot in length, should remain inside the toilet area for this use.

Clean the urine diverting toilet with a damp cloth or paper towel. Water, vinegar or Lysol can be used to dampen the cloth. Do not introduce water or liquid chemicals into the chamber.

If it is evident that there is moisture in the chamber, add an abundant amount of the mix of ash & soil. Check for a possible leak from the urine hose. Periodically, a cup of water can be poured into the urinal section of the toilet to prevent bad odors. When the active chamber becomes 3/4 full, stir the fecal matter and soil mix until it is level. Then add another layer of the ash & soil mix. Remove the toilet from over that chamber and move it to the hole over the other vault. A cover is placed over the opening of the chamber that is composting. It should remain undisturbed for 1 1/2 to 2 years until the other chamber is filled.

USE OF THE ORGANIC FERTILIZER

The composting toilet system has the benefit of providing dry organic fertilizer. This can be collected and used on fruit-bearing trees, ornamental plants and trees as well as tall crops like sorghum and sugar cane. Its use is not recommended for vegetables and low-growing, fruit-bearing plants. The urine that is collected can also be used as liquid fertilizer. Once the receptacle has filled, this liquid is emptied into another receptacle and closed for three weeks. Later, urea fertilizer is prepared by diluting 1 part urine to 10 parts water.



THE ABSORPTION WELL

The absorption well is constructed if the urine is not wanted for fertilizer. For this it is necessary to dig a hole 2 ft in depth by 2 ft in diameter, located in close proximity to the dry composting toilet unit. The well should be filled with smooth, non-porous stone such as river rock, starting with larger stones on the bottom, later smaller stones and then gravel at the top.

If it is desired, 2 absorption wells can be dug; one beside or behind each of the chambers.

It is necessary to introduce the urine carrying hose into the well. The hose only needs to go part way into the well. Be careful that the orifice of the hose is not blocked by gravel or stone.

MATERIALS TO CONSTRUCT THE BASE OF THE TOILET SYSTEM

62 cement blocks

4 bags cement

16 buckets gravel (5 gal . buckets)

16 buckets of sand (5 gal)

4 bags of lime

2 lengths of 3/8" Re-Bar (for floor only)

1/4 kilo construction wire (to tie Re-Bar)

4 meters garden hose of 3/4"

2 clamps for the hose

1 urine diverting toilet and urinal

2 molds for the holes where the toilet will sit

1 liter of diesel or burnt oil to keep cement from absorbing into wood

2 pc. plywood for supporting floor

Scrap wood for framing

1/2 kilo of 2 inch nails

ADVANTAGES OF THE DRY COMPOSTING TOILET SYSTEM

- It does not use water.
- It is not costly to construct or to use.
- It does not occupy much space.
- It can be installed inside or outside.
- With good handling, it doesn't produce disagreeable odors.
- It produces an organic fertilizer that has a minimal probability of pathogenic organisms (organisms that produce illnesses).
- It produces a constant supply of liquid fertilizer. Urine + Water + Time = Urea

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