

The Arborloo and the Charborloo

The arborloo is a pit toilet which is used to grow trees. When the pit is nearly full, it is then completely filled with topsoil (around 15 – 30cm deep) and a tree or other plant is then grown in the filled pit. Alternatively, trees or other plants can be planted around the edge of the pit while the toilet is still in use. The pit is usually .75 to 1 metre deep, and lasts for months. Arborloo literally means “tree toilet”.

Generally, urine would be collected separately, and alkaline, dry wood ash (or soil/sawdust/dry leaves/rice hulls) are scattered over the faeces to cover them after each visit. The layers of dry alkaline ash and dry leaves between the faeces create an aerobic and alkaline environment which reduces or even eliminates any disease organisms, pathogenic worms etc. which may be present. Dry alkaline ash and charcoal could also be thrown into the base of the pit beforehand, in an attempt to stop disease organisms entering ground water.

Peter Morgan has developed this concept, particularly in Zimbabwe, and mango trees, paw paws (papaya), bananas, guavas, mulberry trees, avocado and Australian red cedars (*Toona ciliaris*) have grown particularly well. Where space is limited, paw paws are one of the best because they grow quickly, and when they are finished a new arborloo can be made in the same spot (if space is limited). Pumpkins and tomatoes have also been successful. After a few arborloos have been made, the result can be a whole orchard of a variety fruit trees. Human urine (which is sterile and higher in nutrients than human manure) can be used to fertilize the trees/plants, at around 5% to 20% urine to water. In recent years Peter has achieved outstanding success growing *Eucalyptus grandis*, *E. tereticornis* and mulberry trees around the edges of arborloos, while the toilet is being used. This of course gets the trees growing earlier, and they can be fertilized with human urine/water until the roots reach the manure.

The arborloo recycles waste and improves soil by adding organic matter and nutrients, and thus can provide more food (eg. fruit, nuts, vegetables, grains, honey), fodder, fibre, fuel wood, medicines, timber, etc., without wasting drinkable water as is the case with standard sewerage systems. If there is an initial reluctance to eat produce from composted human manure, other useful plants could be grown, such as bamboo, timber/fuel wood trees and fodder plants.

Arborloos are potentially useful in poor areas around cities in developing countries, where defecation may otherwise occur in the streets and spread diseases, cause problems with flies, smells and so on. Theft and vandalism may be problems, so only tough plants (that can grow back after damage) for shade, wind/dust protection, or fodder grasses/shrubs/trees, bamboo, fuel wood trees etc. may be suitable. Where space is limited, climbing plants may be an option, eg. choko, lablab beans, passionfruit, Chinese gooseberry and grape vines. These could be started while the toilet is still in use.

The charborloo

In some circumstances, such as in very infertile soils, or where pathogenic organisms may be a problem, the “charborloo” may be appropriate. The charborloo is an untested idea of mine, which is similar to an arborloo, but crop wastes, dry grass, dry water plants, wooden sticks, and then on top of them, animal bones, fish heads and skeletons, and any other animal wastes, are placed on top of

the faeces and burnt. When the fire is burning sufficiently, soil is thrown over the fire, or a “lid” of corrugated iron is placed over the hole (to reduce oxygen and induce pyrolysis), thus forming biochar. The biochar (long-lasting organic matter), wood ash (potassium, calcium), burnt bone (additional phosphorus and increased phosphorus availability), and burnt/heated faeces (probably also increased phosphorus availability) should all combine to produce a soil with increased and longer lasting fertility.

The heat of the fire should ensure sterilization, but as an extra insurance, containers of water could be heated on the corrugated iron lid, and then be poured into the pit when the fire has died right down. The lid would be replaced, to keep in the heat and steam, so that the faeces receive an extended and more thorough heat treatment. The steaming may also improve the quality of the biochar. When the charborloo has cooled down, additional nutrients could be added to “charge” the biochar, such as human urine, and chicken manure and molasses, if available.

The ash/faeces/charcoal mixture is likely to be alkaline, so a handful or more of powdered sulphur (if available, otherwise some acidic topsoil) could be stirred into the mixture with a stick, at least in areas where the soil is naturally alkaline. The pit should be filled with good topsoil, which could be improved by mixing some compost into the topsoil. Compost, or vermicompost, which would be even better, could be made with rock dusts such as basalt dust or rock phosphate to provide additional easily available nutrients. The topsoil should preferably include some earth worms, and, if possible, earthworms of a few different species as some may be better adapted than others.

The tree/grass/shrub/climber/groundcover or complementary mixture of these which are planted should be watered, mulched, and protected from potential problems, such as browsing animals (with thorny branches for example), fire and vandalism. In cooler climates a clear plastic tree guard will speed up growth.

Aside from orchards of fruit trees or woodlots, charborloos should be good for cut-and-carry grass fodder systems (eg. for stall-fed dairy cows or goats, fed on Napier grass, Guinea grass or *Andropogon gayanus*, for example, or sugar cane which can be crushed and the juice fed to animals). Some types of trees which do not compete strongly with the grasses (or are complementary) could provide more fodder from leaves and possibly pods/fruit, eg. *Faidherbia albida*, *Prosopis* spp., *Albizia* spp., *Parkia* spp., *Inga* spp., *Gliricidia sepium*, *Calliandra* spp., rain trees, mulberries, *Cytherea* spp. In Mediterranean and cooler climates, fodder grasses/plants could be *Phalaris* spp., *Miscanthus x giganteus*, *Atriplex* spp., *Opuntia* spp., and depending on climate and soils, trees could be *Gleditsia triacanthos*, *Morus* spp., *Paulownia* spp., poplars, willows, carob, *Acacia saligna*, *A. aneura* and tree lucerne/tagasaste (pruned underneath, and alternate branches lopped to let light in), and possibly a Mediterranean climate provenance of *Faidherbia albida*.

Large, tall grasses such as Napier grass could also provide a visual screen, and flowering *Tithonia diversifolia*, *T. rotundifolia* or *Montanoa* spp. grown at the front would make a more attractive entrance. The leaves of *Tithonia* can be composted, made into a nutrient “tea” if chopped into water, or could be used as fodder.

Some people may prefer ornamental plants that are scented, eg. frangipani, gardenia, Ylang Ylang, *Brunfelsia latifolia*, citrus or jasmine.

Plants could also be grown to attract birds, bees and butterflies and provide habitat for wildlife, eg. plants that have nectar as well as fruits/nuts/pods which attract a range of wildlife that eat nectar and different species that eat fruits, eg. *Carica papaya*, *Albizia adianthifolia*, *Faidherbia albida*, *Schefflera (Brassaia) actinophylla*, *Psidium spp.*, *Muntingia calabura*, *Pitosporum spp.*, *Rubus spp.*, *Spathodea campanulata*.

If arborloos are made in areas which are to be reforested, plants that provide habitat for wildlife would be useful, and they would also provide an opportunity to grow climax species that require higher fertility, and result in trees being taller earlier, and so provide perches for wildlife. Many bird species like to nest in thorny plants.

Some useful plants such as *Moringa oleifera*, *Acacia holosericea*, *A. torulosa*, *A. saligna* and tree lucerne do not require very fertile soils, and may just grow more quickly and be even more short-lived, so it would generally be better to grow plants on or around arborloos that require fertile soils.

Arborloos have been tried and tested in numerous countries in Africa, and trees grown in them or around them usually produce spectacular growth. They are becoming more and more popular in both Southern and Eastern Africa, and arborloos and charborloos are likely to be just as useful on the other continents.

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Additional notes:

Ring beams/concrete slabs could perhaps be made of plywood or bamboo (seems like less work than using bricks/concrete, and lighter to transport).

Deckchairs can be modified to make a toilet seat, with no need for a ring beam/concrete slab. The seat fabric is removed, and a commercially available toilet seat is attached to plywood, which is appropriately cut and attached to the seat of the deckchair. I have made one of these to take tourists on four wheel drive camping trips to the tip of Cape York (Australia), and they are perfectly comfortable, over a dugout pit toilet. See also, www.kernowrat.co.uk/.

A few other plants which may grow well:

Fruit trees – loquat, plums, jackfruit, breadfruit, carambola, *Syzigium mallacense* and other “lilypillies”, durian (there is likely to be a smell anyway).

Other plants – *Eucalyptus deglupta*, *E. urophylla*, teak and other timber trees, many palms, some nut trees and probably most species of bamboos.

David Clode, 7 February 2012.

Please visit some of the links for more information about arborloos.

www.ecosanres.org/pdf.../Appendix1_The_Arborloo_book_pdf

www.ecosanres.org/index.htm click on “Trees as Recyclers of Nutrients present in Human Excreta”.

www.aquamortripod.com/Arborloo2.HTM

www.iboro.ac.uk/well/resources/fact-sheets/fact=sheets-htm/Ecological%20sanitation/

www.sswm.info/category/implementation-tools/water.../arborloo

www.en.wikipedia.org/wiki/Arborloo.

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