



7
Day Control



Pit Latrine & Sewage DIGESTER

**PIT TOILET | PORTABLE TOILETS | SEPTIC TANK TREATMENT | HOME SEPTIC SYSTEMS | MUNICIPAL LAGOONS
RESTAURANT GREASE TRAPS | PROCESSING PLANTS | BIOGAS PRODUCTION ENCOURAGER**

1 Introduction

Those of us with daily access to clean and efficiently flushing toilets don't think twice about the hazards of unsafe sanitation, which include diseases like cholera, dysentery and environmental pollution. Cholera outbreaks tend to receive widespread media attention and speedy, crisis-management responses.

Less talked about, but just as deadly, is acute diarrhoea, which is a direct consequence of poor water and sanitation provision. Diarrhoea kills more than 50 000 Kenyan children every year and affects millions more.

The acute health problems that exist or can potentially arise in certain of the urban and in almost all the rural areas of our developing country are as a result of either non-existing or inadequate waste matter treatment.

We are the first to concede that these conditions exist not because of the various authorities neglect but as a result of the almost unbelievable demands that are being made on resources that are not limitless.



BIOpit® Digester can make a very significant contribution to the prevention to the spread of diseases such as cholera, dysentery, diarrhoea, and typhoid which are caused by the lack of waste treatment facilities.

2. What is waste matter?

Waste matter (faeces) is what remains after food has been digested, discharged from the bowels. This material is often inadvertently contaminated with toxic organic and inorganic compounds.

Human waste is a waste type usually used to refer to by-products of digestion, such as faeces and urine. Human waste is most often transported as sewage in waste water through sewerage systems. Alternatively it is disposed of in nappies (diapers) in municipal solid waste.

Human waste can be a serious health hazard, as it is a good vector (an organism that transmits a particular disease or parasite from one animal or plant to another or both viral and bacterial diseases)

A major accomplishment of human civilization has been the reduction of disease transmission via human waste through the practice of hygiene and sanitation, including the development of sewage systems and plumbing.

Human waste can be reduced or reused through use of waterless urinals and composting toilets and grey water.

The most common method of waste treatment in rural areas where municipal sewage systems are unavailable is the use of the septic tank systems/Pit latrine.

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3. What is Sewage treatment, or domestic wastewater treatment?

Sewage treatment, or domestic wastewater treatment, is the process of removing contaminants from wastewater, both runoff and domestic. It includes the physical, chemical and biological processes to remove physical, chemical and biological contaminants.

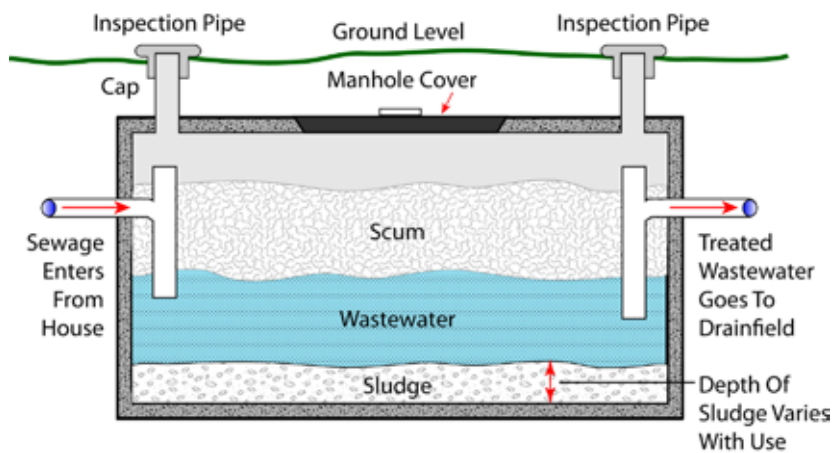
Its objective is to produce a waste stream (or treated effluent) and of solid waste (sludge) also suitable for safe discharge and/or safe re-use back into the environment.

4. Where are these waste matters generally found?

(A) Septic tanks; A septic tank [also known as a septic system] is a small scale sewage treatment system common in areas with no connection to main sewerage pipes. Septic systems are a type of on-site sewage facility;

In rural area where houses are spaced so far apart that a sewer system would be too expensive to install, people install their own, private sewage treatment plants. These are called septic tanks.

A septic tank is simply a big concrete/steel tank that is buried in the yard. The tank/opening might hold 1,000 gallons (4,000 litres) of water. Wastewater flows into the tank at one end and leaves the tank at the other. The tank looks something like this in cross-section:



Schematic of a Septic Tank

In this picture, you can see three layers. Anything that floats rises to the top and forms a layer known as the scum layer. Anything heavier than water sinks to form the sludge layer. In the middle is a fairly clear water layer. This body of water contains bacteria and chemicals like nitrogen and phosphorous that act as fertilizers, but it is largely free of solids.

(B) Pit Toilets.

A pit toilet or compost toilet is a method of collection of human waste, used for composting, controlled decomposition, or disposal used most often in areas with no sewer system. Pit toilets are used in rural and wilderness areas as well as in much of the developing world. Many variations exist, but at its simplest, the principle is that waste is controlled by **BIOpit® Digester**



(c). sewerage by the local authorities or mining institutions

Local authorities

In by far the majority of cases untreated sewage is collected by the local authorities by either:-

- The collection of honey buckets (pit toilets) the contents of which are then poured into a tank/trailer adapted to accept the contents; or
- By employing a vehicle which sucks up the contents from the pit toilets, French drains and septic tanks into a tank

The contents of the tanks are normally deposited into sewage farms, sewerage trenches, or oxidation ponds.



4. How is the wastewater in these three systems biologically treated?

The wastewater treatment in regard to the above three systems is based on the principles of biodegradation. Biodegradation is the process by which organic (derived from living matter) substances are broken down by other living organisms.

Biodegradable matter is generally organic material such as plant & animal matter and other substances originating from living organisms.

Biodegradation is nature's way of recycling wastes, or breaking down organic matter into nutrients that can be used by other organisms.

"Degradation" means decay, and the "bio-" prefix means that the decay is carried out by a huge assortment of (living) bacteria, fungi, insects, worms, and other organisms that eat dead material and recycle it into new forms.

In nature, there is no waste because everything gets recycled. The waste products from one organism become the food for others, providing nutrients and energy while breaking down the waste organic matter. Some organic materials will break down much faster than others, but all will eventually decay.

By harnessing these natural forces of biodegradation, people can reduce wastes and clean up some types of environmental contaminants.

Through composting natural biodegradation organic wastes are accelerated and converted to a valuable resource.

Wastewater treatment using **BIOpit® Digester** also accelerates natural forces of biodegradation. In this case the purpose is to break down organic matter so that it will not cause pollution problems when the water is released into the environment.

Wastewater treatment uses microbes (micro-organism, especially a bacterium causing disease or fermentation) to decompose organic (organic relating to or derived from living matter) matter in sewage.

If too much untreated sewage or other organic matter is added to a lake or stream, dissolved oxygen levels will drop too low to support sensitive species of fish and other aquatic life.

Wastewater treatment systems are designed to digest much of the organic matter before the wastewater is released so that this will not occur.

Sludge, the collection of solids that are removed during wastewater treatment, requires processing to reduce odour and water content. Depending on the disposal method, the sludge also may undergo treatment to decompose organic matter or kill disease-causing organisms.

Bio-augmentation (augmentation means to increase) this is simply the introduction of a group of natural microbial (microscopic organism see next paragraph) strain or a genetically engineered variant so as to achieve bioremediation.

Bioremediation can be defined as any process that uses microorganisms (microscopic organism, especially a bacterium, virus, or fungus) fungi, green plants or their enzymes (a substance produced by a living organism and acting as a catalyst to promote a specific biochemical reaction) [catalyst: a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change] to return the environment [The natural environment comprises all living and non-living things that occur naturally on earth] altered by contaminants (matter that makes impure by exposure to or addition of a poisonous or polluting substances) to its original condition.

The sludge accumulated in a wastewater treatment process must be treated and disposed of in a safe and effective manner.

The basic principle of biological wastewater treatment is the bio-degradation of organic pollutants by a diversified population of bacteria. This population or community is known as the biomass (the total quantity or weight of organisms in a given area or volume)

Treatment systems are prone to failure due to a loss of members of the biomass i.e. there is insufficient bacteria to process a specific volume of wastewater. This can be solved by adding microorganisms (**BIOpit® Digester**) specially formulated for its enhanced biodegradation capabilities.

The application of bacteria in this manner is termed Bio-augmentation. The use of bio augmentation enhances the degradation potential of existing microbial populations.

BIOpit® Digester is formulations of treated bacteria and enzymes when water is added **BIOpit® Digester** is returned to its active state.

The enzymes are included to maintain a high biodegradation while the bacterial community acclimatizes to its environment and begins secreting enzymes.

The purpose of bio augmentation is to reduce the amount of organic matter (is matter which has come from a recently living organism; is capable of decay, or the product of decay) and the number of diseasecausing microorganisms, (organism an individual animal, plant, or single-celled life form: a bacterium, virus, or fungus) present in the solids.

The Process

1. **Application:** Dissolve the 500gm pack in 2 litres of warm water (not hot). Let it sit for 1 hour before pouring in your pit latrine/ septic tank etc.

For pit latrines, starting with the following day, you should pour in 20 litres of plain water daily for 7 days. This is intended to create a healthy environment for the reproduction of the bacteria to consume the sludge.

Caution: Application of toxic chemicals deactivates BIOpit® Digester. Avoid applying toxic chemicals in your pit latrine/ septic tank as this will kill the Micro organisms needed for clearing the scum.

Once you apply Biopit Digester into your pit latrine, do not pour in soapy water at least for 2 months. Soapy water kills the useful micro organisms.

Dosage Guide lines	Initial Dosage	Maintenance Dosage
Pit latrines, Septic tanks Waste ponds of size 480cub.ft.	500gms per 2 weeks for 1 month	500gms per 2 weeks for 1 month
Industrial effluent e.g. abattoir: 480cub.ft.	100 gms for 3 consecutive days	30 gms per day
Sewage plant trickling filler 480cub.ft.	0.5% once off w/w	0.25% w/w
Anaerobic digester oxidation pond. Activated sludge : 480cub.ft.	5% for 3 days w/w	2.5 w/ w/ weekly

2. The bacteria and enzymes aerobically and anaerobically digest (biodegradation and bioremediation) the sludge and waste water to metabolically convert these organic substances for their energy, which in turns produce water of such a quality that the water table and surrounding soils are not polluted or contaminated.

(iii) **BIOpit® Digester** is a safe, natural, biological process which reduces organic material to harmless water and soluble substances like nitrates and gases. In the process, pathogens and harmful micro-organisms are destroyed, so they cannot contaminate underground water or spread diseases like cholera. Pit latrines can cause underground water pollution and are less hygienic.

BIOpit® Digester: BENEFITS OF BIO-AUGMENTATION AND BIO-REMEDICATION

Septic tanks, conservancy tanks and pit-toilets

- **BIOpit® Digester** contains natural harmless micro-organisms chosen for their specific abilities to accelerate the biodegradation process of human, vegetable, animal, fibrous and hydrocarbon waste;
- In addition some of the microbes used, due to their unique capabilities of converting an anaerobic to an aerobic environment, eliminate waterborne diseases such as dysentery, diarrhoea and typhoid;
- Other microbes in the products compete with the cholera and other disease producing bacteria for the same food source, starving these diseases producing bacteria and preventing it from spreading.

Benefits:

- Biodegrade, empty, the total sewerage and paper content of a pit toilet (long drop) in between 5 to 20 days without contaminating the groundwater with waterborne diseases including cholera.
- Biodegrade the hydrogen sulphides, the sewerage smell, within 24hrs to 48hrs;
- Biodegrade the solid effluent in the chambers of a septic tank including decongesting the soak-away, rendering the system functional including the other health benefits referred to above;
- Decongest the anaerobic and aerobic solid effluent in oxidation and maturation ponds at a far less a cost of conventional methods and with the added health benefits that mechanical methods don't have.
- Accelerate the biodegradation process in hydraulically overloaded sewerage works to accommodate the extra load and to ensure that the final effluent conforms to discharge standards, including the health benefits;
- Biodegrade sewerage spills in rivers and dams rendering the water safe again;
- Bioremediation of contaminated soil and water by hydrocarbons.

Other sewerage and waste related problems that will be remedied with the added health benefits the “BIOpit® Digester” products enjoy:

- Aqua privy toilets | Conservancy tanks | French drains
- Fat & grease traps | Anaerobic reactors | Bio-filters
- Aeration chambers
- Clarifiers
- Anaerobic digesters
- Humus tanks
- Activated sludge systems
- Reactivate systems after hazardous chemicals have killed off the biomass
- Biologically activate new systems
- Clear sewerage blockages in drains and congested manholes

Biogas Production encourager

BIOpit® Digester Enzymes bring a wide range of processing benefits and can bring important cost savings by:

- Improving processing efficiency
- Reducing production time
- Replacing physical and chemical treatments
- Reducing energy needs
- Using less raw materials.

