THE IMPORTANCE OF BIOMASS IN A SYSTEM O))

In any septic system that is based on wastewater treatment and infiltration into the native soil, a biomass develops at the soil interface. **Although this could be a sign of future problems for some systems, it isn't the case for all technologies**, and it is generally essential to the proper functioning of the system.

This article aims to demystify the impact and treatment-related role of the numerous microorganisms present in the different components of System O)) solutions and clear up the importance of these microorganisms in the proper functioning of these solutions.

In the case of a System O)) solution, there are different components that treat the water: microorganisms inside and around the Advanced Enviro)) Septic (AES) pipes, the system sand, and the biomass under the pipes, specifically those inside the system sand, called "biomat".

ROLE OF THE BIOMASS INSIDE AND AROUND THE PIPES

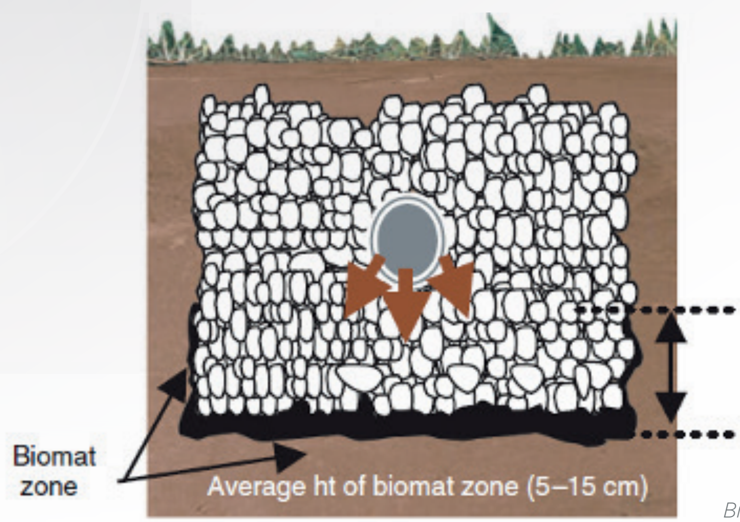
The microorganisms inside and around the AES pipes are the first to treat the effluent leaving the septic tank. In the vast majority of the time, this biomass is mainly composed of aerobic and facultative bacteria as the ventilation system provides a well-aerated environment inside the pipes. The water coming from the septic tank is treated by this biomass first. The importance of the treatment depends on the water's retention time, which in turn depends on the sieve analysis of the system sand and the permeability of the biomat.

ROLE OF THE SYSTEM SAND

The bacteria are not the only ones who treat the water. The system sand under the AES pipes also contribute to the treatment. **It serves as a filter by catching insoluble pollutants and increasing the water's retention time. This is why its sieve analysis is so important.** System sand limits the flow of water to allow the biomass enough time inside the pipes to properly digest pollutants. Moreover, system sand is ideal for microorganisms as it provides a very large contact area, helping them hang on. Since we are now deep underground, the oxygen is generally less so that we are mainly in an anaerobic environment. Anaerobic bacteria can develop and thrive, allowing for a second type of treatment. This mass of anaerobic bacteria in the sand is known as biomat.

ROLE OF THE BIOMAT

The biomat is mainly composed of anaerobic bacteria as well as their extracellular matrix. As it digests pollutants in anaerobic mode, this layer grows more and more at the beginning as the biomass in the pipes is still small. The more it develops, the more the sand's porosity goes down, increasing the water's retention time inside the pipes which improves the first aerobic treatment and the filtration of pollutants. **This improvement of treatment in the pipes by increased retention time is important as it reduces the quantity of pollutants that reach the biomat.** This is an extremely important phenomenon in this context since although it is essential to the treatment, the growth of the biomat must absolutely be controlled (Knappe, 2020), (Tomaras, 2009). **For most conventional systems, it is this uncontrolled growth of the biomat that clogs the native soil, caused by the absence of treatment before the wastewater infiltrates into the soil as well as the absence of aerobic conditions.**



Biomat (Beal, 2005)

HOW IS THE BIOMAT CONTROLLED?

System O)) solutions have many characteristics that help them avoid excessive sludge accumulation and clogging by the uncontrolled growth of the biomat. First, as discussed in the DBO))Clic – Sludge, **alternating between aerobic and anaerobic conditions influences the metabolism of the bacteria, prioritizing catabolic pathways and breaking down molecules as opposed to growing the biomass.**

Moreover, the treatment system's passive ventilation is key in contrast to the majority of conventional systems. **The vents allow for constant aeration in the pipes, which reduces the growth of anaerobic bacteria, controlling the thickness of the biomat.**

Finally, it must be noted that the system is often at rest. When there is no wastewater making its way to the pipes, be it at night or during prolonged absences, the system receives no organic load. This means that the bacteria fast for periods of time, which limits the growth of the biomat and enables the aerobic bacteria to regulate it. During this time, thanks to favourable conditions and reduced availability of nutrients, **the aerobic bacteria rely on the biomat, reducing its thickness and controlling its growth** (Leverenz, 2009), (Beal, 2005).

With all these processes, the size of the biomat becomes balanced under the AES pipes. This allows for optimal treatment without degradation over time.

Detailed inspections of systems with over 15 years of use confirm these explanations:

System installed in 2004, inspected in 2019

System installed in 2003, inspected in 2020

SHOULD A BLACK LAYER BE FOUND WHEN A SYSTEM IS INSPECTED

During a detailed inspection of some systems, it is possible to see a black layer under the system's pipes. This is the biomat. It is important to consider the information provided in this article before panicking and immediately assuming that the system must be replaced. Although this layer has historically been associated with clogging, it's a key element in the treatment when controlled!

CONCLUSION

Different components of a System O)) solution are responsible for the treatment of wastewater, including microorganisms inside and around the Advanced Enviro))Septic pipes, the system sand, and the biomat. Each component has a specific role and together form a combination that is ideal for wastewater treatment. It is important to note that the biomass can be controlled and that it is required for the proper functioning of System O)) solutions and – by the same token – preserving nature's balance.

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