

WASTEWATER TREATMENT AND REGENERATION BY HIDROLUTION FMF SYSTEM (FLOATING MACROPHYTES FILTER)

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Abstract

After more than 10 years of implementation and monitoring wastewater treatment plants (WWTP) by FMF Hidrolution system (Torres, 2004a,b), they have been studied in detail the biological and chemical processes occurring in the entire system to understand the intrinsic operation. For two years there was an accurate observation of the physic-chemical and microbiological WWTP in operation. After this time, the study results indicated that there are three different substrates in the rafts of treatment. First, a floating substrate, the SES-f, where reactions occur predominantly aerobic. Second, an anaerobic substrate, the SES-a, where reactions are mainly anaerobic fermentation. And third, a substrate formed from the interaction of both, named SIS, with facultative characteristics. Thanks to the interaction between these substrates, the organic matter is degraded completely by the catabolic activity of microorganisms adapted to varied environmental conditions.

This system allows effective sewage purification, environmentally friendly and sustainable low cost implementation and minimal maintenance, even for small populations without energy consumption, sludge management and generation of odors.

Key words

FMF, wastewater, treatment plants, macrophytes, sustainable.

Introduction

The water is a strategic resource, it has been the basis of life and it is necessary for survival on planet Earth.

"Sustainability" teaches us to use natural resources so that once applied to satisfy our consumption of goods and services it may be returned to nature with the same characteristics of use that were extracted from it.

A team of Spanish technicians applying this concept to the use of water has designed a new sustainable ecosystem whose main application is the regeneration of all types of contaminated water.

This new ecosystem or sustainable environmental infrastructure, called "FMF ®" floating macrophyte FILTER, its features and benefits, has been used in over 125 treatment plants successfully.

Methodology

For over 10 years Macrofitas Company has been developing this powerful technology whose technical base is convert artificially in floating plants species that usually are rooted to the soil of wetlands. The plants used in these WWTP are traditionally known as cattails, reeds, etc. It was essential to develop the support system, consisting of parts ESE ®, EFE ®, CRC ®. Once the emergent macrophytes are floating, they intertwine their roots in order to create a tapestry working as a phytoremediation technology free on the wastewater surface (Torres, 2004a,b).

Like any conventional biological purification system, there are aerobic microorganisms, in this case living in symbiosis with roots, which are responsible for the digestion, degrading and oxidizing organic matter. They can do it thanks to the oxygen-rich environment that is generated in the rhizosphere. The great secret of these macrophytes plants is their natural ability to inject oxygen from the air to the contaminated water through internal channels, structures and specialized membranes to release oxygen into their roots to compensate for the isostatic pressure differential between the two media.

Additionally, plants also treating water by adsorption of ions, pollutants, heavy metals, anions (nitrates and phosphates), further enhancing the removal of coliform bacteria and pathogens, performing a task in the process tertiary getting the regeneration and reuse of effluent.

Results and discussion

If you also put this oxygenized filter floating interacting with volumes of water with large amounts of organic content (sewage), the result is a sustainable ecosystem and a scoop at ecological level: the "Catálisis degradativa de la copromasa" CDC " (catalysis of sewage matter) by "bomba de magnificación biológica" "BMB" (biological magnification pump), through synergistic interaction of structured substrates "SES," getting Synergy System Integrator SIS.

While a natural lagoon accumulates dense organic matter in the bottom and there it is degraded slowly by fermentation substrate-level and anaerobic respirations, resulting in less dense organic matter, volatile solids and gases such as methane with high-polluting effects, a FMF ® captures all of these pollutants, subjected to aerobic breathing (18 times more profitable than the anaerobic energy), and out of the water line, creating oxidized products less aggressive for the planet's ecological balance.

Inside FMF ® treatment plant, the water volume is structured in three levels or "substrates" differentiated. First, an upper substrate of the sheet of water or SES-f, floating synergistic structured substrate. Second, a lower substrate on the bottom of aquatic ecosystem, or "SES-a" structured synergistic anaerobic substrate. And third, an intermediate substrate between both of them, or "SIS" named system integrator synergy.

In the different substrates depending on the physicochemical characteristics of each one, there will be different populations of microorganisms that have characteristics catabolic pathways. Thanks to the combination of these, there is the "Biological Pump Magnification" and you get to treat wastewater with an efficiency greater than 98%, while eliminating odors and allowing the complete degradation of the sludge.

Conclusions

This purification system thanks to its low cost, lack of energy consumption and low maintenance and construction costs can be applied from small populations, including single-family houses to population of over 100,000 inhabitants.

Thanks to the stability of the flotation media, the injection of oxygen by plants and the complete degradation of the sludge by microorganisms in the water, this system is a perfect solution to improve activated sludge treatment plants to achieve significant energy savings and sludge management.

References

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