

Stabilization of Septage from a Small Community, with Effective Microorganisms (EM•1®)

Subsequent Use as a Source of Nutrients in Agriculture

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In Costa Rica, the septic tank is the most common system used for the management of domestic wastewater. In this type of system, large quantities of water are used to transport wastes to the tanks, where a primary sedimentation process, and consequently accumulation of water mixed with solids, occur. This mixture is called septage and contains water, bio-solids, pathogenic microorganisms, and heavy metals (Spellman, 1997). In Costa Rica, treatment is provided to only 4% of septage produced before it is discharged into rivers or other bodies of water (Villegas, 2002). Due to this unsanitary practice, and the legal problems that disposal companies face, EARTH University is looking for an effective, easy, and feasible treatment that allows the safe reuse or disposal of this material.

The present project is an initial investigation into an adequate treatment for septage from a small community that would allow for its subsequent use on agricultural lands. The goal of the treatment is to stabilize the biological and physical characteristics of the septage, thus transforming it into a usable material. This stabilization ensures the elimination of pathogenic agents and decomposition of products that emanate offensive odors. To accomplish this goal, the product Effective Microorganisms (EM•1®) was used. This product is a mixture of beneficial microorganisms that create a negative environment for the pathogenic and odor producing agents. The study was carried out in two stages. In the first, triplicate samples of septage were incubated anaerobically with five concentrations of activated EM•1® (0%, 2.5%, 5%, 7.5%, and 10%, v/v), and samples were analyzed for various parameters every three days for 15 days. In the second phase, six replications of three treatments from phase one (0%, 2.5%, and 5%, v/v activated EM•1®) were incubated anaerobically samples were analyzed for various parameters every three days for 15 days.

In both experiments a positive effect of EM•1® at all concentrations, as compared to the treatment without EM•1® was observed in the analyses of samples for pH, odor, turbidity, total solids, BOD₅, DO, Coliforms, total nitrogen and ammonium-nitrogen. Without EM•1®, the septage had the characteristic fecal odor throughout the entire incubation. The samples from the EM•1® treatments had a characteristic odor of fermentation. With the EM•1® treatments it was possible to eliminate the coliforms from the samples. As well, a reduction in BOD₅, DO, and total solids was observed. After three days, in the samples treated with EM•1®, the level of BOD₅ was lower than the permissible level of <300 mg L⁻¹ (MINSa, 1997). However, after 15 days of anaerobic incubation, the levels of DO and total solids were still in excess of those permissible by law for discharging the water into the environment (<1 000 mg L⁻¹ and <2 000 mg L⁻¹,

respectively) (MINSA, 1997). The results showed that EM•1® is effective for stabilizing septage, so that it can be used as a source of nutrients in agriculture.

References

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Congress

subjects to which the poster relates:

Shaping Sustainable Systems conference:

- Water

(conservation, salinity, quality, recycling)

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Community (rural initiatives, socio-economic factors)

- Organic

systems and environmental management