

## SEPTIC TANK SLUDGE: TOXICITY EVALUATION THROUGH *Vibrio fischeri* AND *Lactuca sativa*

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### Abstract

According to IBGE (2007) about 80 million Brazilians still use septic tanks to treat sewage, which is responsible of more than 80.000m<sup>3</sup>/day of wet sludge generating. The treatment and conditioning of sludge generated are essential to reduce the risk of environmental contamination. This study aims to evaluate the toxicity of septic tank sludge samples collected in Itapetininga - SP, on microbiota and plants through ecotoxicological studies (in marine bacteria *Vibrio fischeri* species) and phytotoxicological studies (in vegetables of *Lactuca sativa* species). Geotextile containers (GC) were used with different apparent openings (0,44, 0,48 and 0,57mm) and GC with addition of cationic polymer to the sludge. According to results, the different openings of GC does not interfere in the toxicology of the analyzed species, but, to be added the cationic polymer, has been observed 7,9% of EC50 (effective concentration that causes adverse effects in 50% of organisms) for *Vibrio fischeri* and 54,5% for *Lactuca sativa*. Therefore, the addition of the polymer, used to accelerate the sludge thickening, can cause adverse effects in organisms, so it is important a detailed investigation of this effect in other studies.

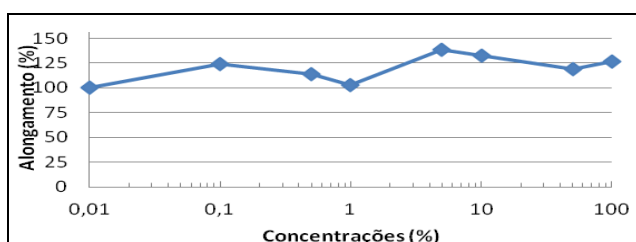
*Key words: septic tank sludge, phytotoxicity, ecotoxicity.*

### Introduction

Approximately 36,68% of Brazilian urban population (68 million) and 63,72% of the rural (12 million people) have their sewage treated and conditioned in septic tanks<sup>1</sup>, generating just over 80,000 m<sup>3</sup>/day of sludge, especially in the poorest regions, where public systems of collection and treatment of sewage are inefficient or inexistent.<sup>2</sup> Because of the growing increase in generation, and the difficulty of treatment and final disposal of this waste, the present study aims to evaluate the sludge toxicity to organisms *Vibrio fischeri* and *Lactuca sativa* aiming at use in agriculture. Since this is one of the most effective and economical way to final disposal, held on agricultural land areas, still allowing the reuse of nutrients such as nitrogen and phosphorus.

### Results and Discussion

Are presented in Chart 1 and Image 1, the results obtained by toxicity analyzes of sludge put up in different GC.



**Image 1.** Evaluation of EC50 in lettuce seed for GC AA 0,44mm

### Chart 1. Results of toxicity tests

Sample (GC)	<i>Vibrio fischeri</i> (EC 50)	<i>Lactuca sativa</i> L. (EC 50)
AA 0,44mm	0%	0%
AA 0,48mm	0%	0%
AA 0,57mm	0%	0%
International with Polymer	7,9%	54,48%

It was observed that samples of national GC showed no toxicity to any of the organisms. In the case of GC international, with the addition of cationic polymer, samples showed toxicity to the organism tested.

### Conclusions

The toxicity of the sludge come from the dewatering system geotextile containers, varies according to the material used in the containers, and the addition of polymer can cause an increase of the phytotoxicity.

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<sup>1</sup>IBGE (Instituto Brasileiro de Geografia e Estatística). **Pesquisa Nacional por Amostra de Domicílios: Síntese de Indicadores 2007**. Rio de Janeiro, 2008.

<sup>2</sup>ANDREOLI, C. V. **Lodo de Fossa Séptica: Lodo de fossa e tanque séptico: caracterização, tecnologias de tratamento, gerenciamento e destino final**. PROSAB5 (Programa Nacional de Pesquisa em Saneamento Básico). 1ª ed. 390p. Curitiba, 2009.