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Microbiological effects on food crops fertilized with biosolids produced in an ecosan system

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Abstract

In South Africa, as in other countries mainly from the developing world, ecosan systems are used as an attractive alternative to pit toilets and latrines for sanitation. One of the ecosan toilet's characteristics is to separate urine from feces, thus allowing the latter to be quickly dehydrated. Also, the faecal material from ecosan toilets can be quickly, easily and safely emptied. After some months of dry storage, the sludges turn into a new product, sometimes called "humanure," that can be defined as the biosolids produced by an ecosan process. Some research studies have already shown that ecosan biosolids can be beneficially used to increase agricultural yields (Esrey *et al.* 1998; Austin and Duncker 2002). But the possible spread of pathogens (and diseases as consequence) is still a major concern. This possible risk is due to the fact that that more helminth ova are normally encountered in biosolids from developing countries and it is very difficult to reduce them below 1 HO/gTS by any economical technology (Jimenez *et al.*, 2004), as is required by the EPA guidelines for biosolids intended to be used for agriculture. Thus this research looked to determine the microbial effects of applying biosolids with 1 - 30 HO/g dry TS on crops that are eaten raw. To fulfill the objective spinach and carrots were selected. These vegetables are frequently eaten raw in rural areas of South Africa and also have the advantage (for experimental purposes) of being easily contaminated (one grows near the soil while the other below it). As microbial indicators, faecal and total coliforms, *Salmonella spp.*, faecal streptococcus, *Aspergillus spp* and helminth ova were analyzed in the soil prior to the biosolids application, the water used for irrigation, the biosolids applied and the harvested crop (roots and leaves). Biosolids applied contained 0 HO/gTS, 1 HO/gTS, 10 HO/gTS and 30-35 gHO/gTS). In the 16 different plots, the same N rate was applied, by adjusting the N content added through biosolids with an appropriate quantity of fertilizer. The results of this project are discussed in the paper.

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