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Plant Phenotyping Tests Using Anaerobic Digested Vinasse and Filter Cake from the Brazilian Sugar Cane Industry

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Abstract

The ethanol and sugar production in Brazil processed 653,5 million tons of sugar cane in the 2013/2014 harvest. Approximately 700 million tons of agricultural and industrial wastes are generated, which might cause environmental pollution. The recycling of these residues regarding their contents and energy potential becomes significant. Samples of vinasse and filter cake and Red Oxisols from sugar cane processing areas were collected and characterised. The total solid content of vinasse is 2,57% (volatile solids 55,0%) and filter cake 29,4% (volatile solids 69,5%), NPK content in vinasse is (kg t^{-1}) Ntotal: 0,4, P_2O_5 : 0,36, K_2O : 2,80; in filter cake: Ntotal: 1,20, P_2O_5 : 2,20, K_2O : 1,60. Blends of vinasse and filter cake were prepared and anaerobically digested. Tests in rhizotrons are designed to monitor plant traits in the same conditions as in the sugar cane producing tropical savannah of Brazil called “Cerrado” comparing the effects of applications of a blend of untreated vinasse and filter cake as well as digested. The samples are from the late dry season of October 2014. Previous batch tests performed after VDI 4630/2006 demonstrate that the biodegradation of the substrate reaches almost 90% after circa 16 days. In addition, a recycling of the residues as biofertiliser based in organic matter, chemical and physical parameters are tested in offering improvements of soil quality and plant growth (soy bean and crotalaria) comparing application in raw form and digested. The monitoring of the industrial process confirms that the organic matter can be recovered as nutrient and bioenergy source. This work contributes to the mitigation of environmental impacts as well as to improve the carbon efficiency of the sugar cane transformation process.

Keywords: Biofertiliser, biogas, Red Oxisoil, rhizotron