

AGE003-P04

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## Unsaturated hydraulic conductivity reduction of an Andisol during vinasse application

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As a result of increasing production of bio-ethanol, the disposal and utilization of vinasse, which is distillery wastewater, are of increasing importance worldwide because up to 20 liters of vinasse may be generated for each liter of bio-ethanol produced. Since vinasse contains ingredients that can be used as fertilizer, one approach would be to directly apply vinasse to land as irrigation water and fertilizer. To establish a sustainable recycling system including the land application of vinasse, more detailed information on the effects of applying vinasse to soil and environmental issues is required. The objective of this study was to examine the impact of vinasse on unsaturated hydraulic conductivity. Column experiments were conducted to determine the temporal change of unsaturated hydraulic conductivity with continuous loading of vinasse. The value of unsaturated hydraulic conductivity near the soil surface (2.5-7.5 cm) decreased rapidly within the initial 2 days, then remained almost constant for the following 3-5 days. The magnitude of unsaturated hydraulic conductivity reduction was one to two orders, which depended on the initial volumetric water content when the vinasse started to be applied to the soil columns. The value of unsaturated hydraulic conductivity of the deeper soil layers (7.5-12.5 cm, and 12.5-17.5 cm) decreased slightly. Rapid reductions in unsaturated hydraulic conductivity are associated with biological clogging near the soil surface of the columns. Since vinasse contains easily decomposable organic matter that allows microorganisms to reproduce, the application of vinasse caused biological clogging of unsaturated soils and the reduction in unsaturated hydraulic conductivity in the soils.

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Keywords: Bio-ethanol, Vinasse, Hydraulic Conductivity, Andisol