

CONCENTRATED VINASSE USE ON SUGARCANE PLANTS: SOIL CHEMICAL ATTRIBUTES, ION LIXIVIATION AND AGRONOMIC EFFICIENCY MONITORING

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Figure 1. Vinasse application in the plot experiment

The increasing ethanol production represents many advantages to Brazil as a less pollutant renewable fuel, but it will generate higher quantities of vinasse, the residue that is applied as a fertilizer for sugarcane. On the other hand, it is already known that there is a potential risk of ion lixiviation to the underground waters when high rates of vinasse are applied to the same soil during several years. In this way, other uses for vinasse shall be studied, but the high vinasse value as an organic fertilizer turns indispensable to find out new viable procedures for its use on sugarcane cropping. In this sense, the concentrated vinasse might be one alternative to take the residue to more distant soils, contributing to the sugarcane nutrition with significant savings for the country on imported fertilizers. However, further investigation is urgently required to find out whether the concentrated vinasse is a potentially higher pollutant residue than the natural vinasse. In order to evaluate concentrated vinasse effects on soils and its potential risk of ion lixiviation to underground waters, some trials are being carried out. The specific aims are: (1) Compare the normal and concentrated vinasse physical-chemical characteristics from several samplings from the same factory, and also, to compare their characteristics with the parameters established by the legislation for agriculture use. Besides, to evaluate the concentrated vinasse residue effects on soils, in order to obtain knowledge to its sustainable use in crop ferti-irrigation mainly to sugarcane cropping; (2) Evaluate the concentrated vinasse biodegradation and mineralization compared to the normal vinasse; (3) Evaluate the ion lixiviation potential of concentrated vinasse compared to the normal vinasse and to the mineral potassium fertilization; (4) Evaluate the concentrated vinasse agronomic potential as a source of nutrients to sugarcane crop.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

This project started in November 2009 by plotting the field experiment. The area used was located in Batatais region, São Paulo State, and the sugarcane was in the first ratoon stage. The results reported at the present are still preliminary being the conclusions expected in September – October of 2010 by harvesting the plants and analyzing all the samples for monitoring vinasse uses.

In the experiment, samples of two kinds of vinasse were applied, one is the vinasse that is normally obtained in the ethanol production (normal vinasse), and the second is a concentrated vinasse, both proceeding of the same sugarcane mill. A scheme for sampling and analyzing vinasse samples periodically was established so the different vinasses were compared (Table 1). The results showed that chemical properties of both vinasses are similar, however macronutrients concentrations, especially potassium (K), are higher in concentrated vinasse. There were variations on macronutrients contents in vinasse through the months, but in general, K concentrations have been 20 to 30 times higher in concentrated vinasse.

Soil samples, obtained from the field experiment, were taken to the laboratory to evaluate carbon (C) and nitrogen (N) mineralization after normal vinasse and concentrated vinasse application. The preliminary results of these tests showed that C and N mineralization occurs faster with normal vinasse when compared to concentrated vinasse.

Table 1. Macronutrients and pH in concentrated vinasse compared with normal vinasse

	pH	N	PO ₄ I	K ₂ O	Ca	Mg	SO ₄
		g L ⁻¹					
Vinasse	4,1	0,35	0,08	2,18	0,19	0,35	1,1
Concentrated vinasse	4,1	3,7	1,3	52,8	3,1	4,4	18,2

N – Kjeldahl, K – flame photometry, P, Ca, Mg, SO₄ – ICP-AES

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