

EFFICIENCY OF A HUMIC ACID BASED SOIL CONDITIONER IN SUGAR CANE CROP

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Introduction

Organic matter providing enormous benefits to agricultural production is one of the most ancient knowledge, but yet little is known about them. Use of organic matter improves soil physical, chemical and biological properties, and technical advantages. However, due to high cost and / or large volumes required, the application of organic matter as fertilizer in fields is limited to a small group of growers.

Many attempts have been made to increase sugarcane productivity. One of them is to use mineral fertilizers more efficiently, thus reduce costs and sustain production of sugar-alcohol sector. Under this principle, organic minerals with humic acids base were selected with aims to improve fertilization efficiency level of soil organic matter, and soil physical, chemical and biological properties.

This work was to determine effect of an organic soil conditioner, organic mineral humic acid to plant and ratoon cane. Furthermore its interaction with mineral fertilizer was also investigated.

Materials and Methods

Two trials were conducted at Santa Cândida Mill, City of Bocaina - SP. The first trial was plant cane variety RB 867515 located in Farm Bateia, with neosoil quartzenic sandy soil found in the production environment D1 (PRADO, 2005). After opening the furrows, the application of the organic mineral product was done at the same time as mineral fertilizer. The second trial was ratoon cane variety PO88-62 located in Farm Santa Inês with neosoil quartzenic sandy soil found in the production environment D2 (PRADO, 2005). The application of organic mineral was performed during the mechanical cultivation of the ratoon.

Experimental design for both trials was randomized blocks in split plots with 4 replications, being the main treatment to be fertilizer doses. In the plant cane trial there were two doses of the organic mineral (0 and 350 L/ha) with combination of 0, 800, 1600 and 2400 kg/ha of liquid fertilizer 2.5-10-10. However in ratoon cane trial, there were three doses of the organic mineral product (0, 300 and 600 L/ha) with combination of 0, 800, 1600 and 2400 kg/ha

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of liquid fertilizer 10-0-10. Each plot comprised of four rows with 50 meters in length. Samples were taken from middle 30 meters. The Agrolmin® organic mineral product was used in the experiment obtained by extraction of natural peat mine with the following properties: pH = 5.67, total organic matter (humic substances) = 89.72%, total N 5% (padronized from the natural product complemented with mineral N).

At harvesting, cane was cut, weighed and evaluated. Analysis of variance was performed by SAS statistical program, the test medium analyzed by Tukey at 5% significance.

Results and Discussion

There was a significant difference in cane yield related to the doses 1600 and 2400 kg/ha of mineral fertilizer when compared to the control. However there was no significant difference between the doses of 800, 1600 and 2400 kg/ha. It was also found that the use of 350 L/ha significantly increased the cane yield to 177.78 t/ha, compared to the control, 130.02 t/ha (Table 1 and Figure 1).

Table 1 - Averages of productivity in the cane-processing plant, variety RB 867515. Bocaina-SP. ESALQ, 2009.

Fertilizer	Doses	Productivity (t/ha)
Mineral fertilizer (kg/ha)	1600	129,17 a
	2400	128,35 a
	800	123,96 ab
	0	114,13 b
Agrolmin® (L/ha)	350	177,78 a
	0	130,02 b

- Means followed by the same letter are not different by Tukey test at 5% probability for all treatments.

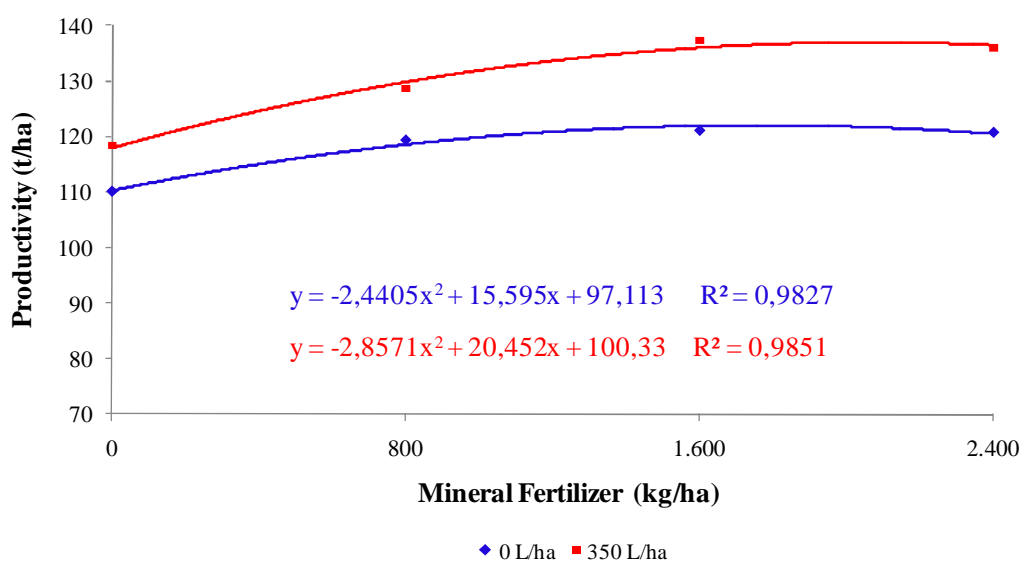


Figure 1 - Quadratic Regression - mineral fertilizer at different rates of humic acid - sugar cane plant. Bocaina-SP. ESALQ, 2009.

In ratoon cane, there was a significant response in cane yield (Table 2 and Figure 2) using the Agrolmin® compared to the control, but no significant difference between doses of 300 L/ha and 600 L/ha.

Table 2 - Averages of productivity treatments in ratoon cane, variety PO88-62. Bocaina-SP. ESALQ, 2009.

Fertilizer	Doses	Productivity (t/ha)
Mineral fertilizer (kg/ha)	2400	127,87 a
	1600	123,95 a
	800	116,71 ab
	0	100,97 b
Agrolmin® (L/ha)	600	125,13 a
	300	122,19 a
	0	104,81 b

- Means followed by the same letter are not different by Tukey test at 5% probability.

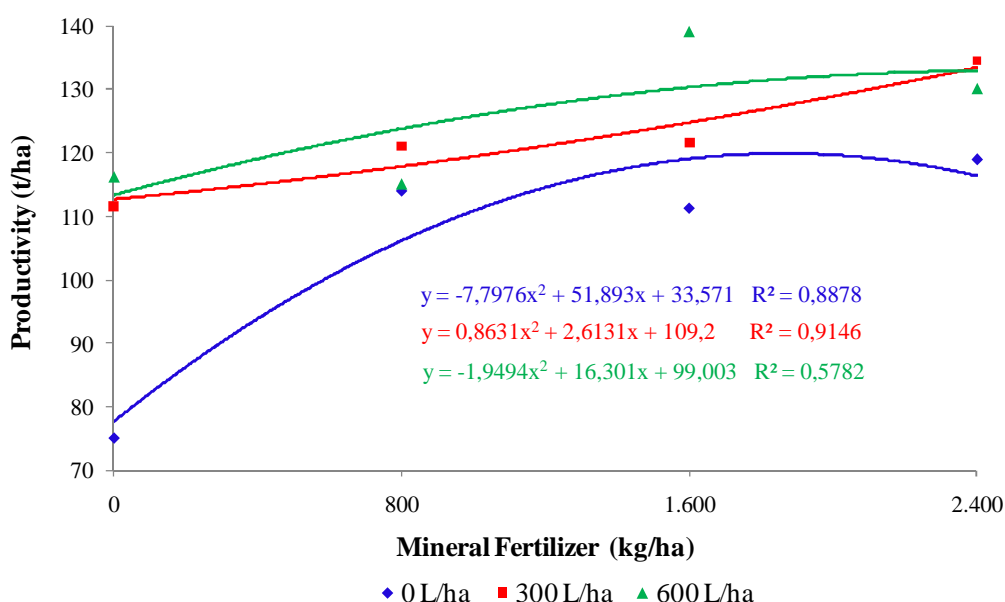


Figure 2 - Quadratic regression - mineral fertilizer at different rates of humic acid - ratoon sugar cane. Bocaina-SP. ESALQ, 2009.

With regard to mineral fertilizer, there was significant difference between the doses of fertilizer and control, but no significant difference between the doses of fertilizer at 800, 1600 and 2400 kg/ha. No significant interaction between doses of mineral fertilizers and doses of Agrolmin® were found.

It was also observed during the conduct of experiments that both plant and ratoon cane treated with humic acid showed fewer symptoms of drought like less root system, thinner stalks and shorter internodes, than the plots without this input. Cane yield was increased by number of tillers and larger diameter of the cane stalks. These symptoms are related to improved plant nutrition by greater absorption of nutrients. Increased availability of nutrients,

particularly nitrogen, was directly related to the increase in the diameter of stem and tillering of culture (Van DILLEWIJN, 1952; HUMBERT, 1968; ALEXANDER, 1973; CLEMENTS, 1980; RODRIGUES et. al., 1983; BEAUCLAIR, 1984). This increased availability of nitrogen is related to an increase in content and, consequently, the decomposition and mineralization of organic matter, as suggested by Beauclair (1984), provided by using humic acid.

Although these results showed that the use of humic acid resulted in consistent increase in cane yield, it does need a greater number of studies and analysis of the issue to better characterize the causes and effects.

Conclusions

For the cane plant, the use of a commercial product of humic acid of 350 L/ha resulted in a significant increase of cane yield, and the dose equivalent to the use of 800 kg/ha of mineral fertilizer.

In ratoon cane, the doses of 300 and 600 L/ha of humic acid resulted in a significant increase of cane yield equal to 1,200 kg/ha of mineral fertilizer.

Use of this soil conditioner may be feasible in the case of increase in production combined with reduction of mineral fertilizer.

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