Soil microbial biomass and mineralizable carbon as a function of crop rotation and soil acidity amendment in a no-tillage system in Brazil

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Support: FAPESP

INTRODUCTION

Crop rotation and surface application of soil acidity amendments could affect short-term dynamics of active fractions of soil organic matter.

OBJECTIVE

Our aim was to evaluate the microbial biomass and mineralizable carbon in the profile of a Rhodic Hapludox as a function of crop rotation system and surface application of soil amendments to alleviate acidity constraints in a no-tillage system in Brazil.

MATERIAL AND METHODS

The experiment was set up in October 2006 in Botucatu, State of Sao Paulo, Brazil. The experimental design is a randomized block in a split-plot with four replications. The plots comprise the crop rotations and the subplots the superficial application of soil acidity amendments, and a control.

Application of lime and silicate

Reapplication of lime and silicate

	2006	2007		2008		2009		2010		2011		2012		2013	
	summer	winter	summer	winter	summer	winter	summer	winter	summer	winter	summer	winter	summer	winter	summer
System I:	soybean	fallow	maize	fallow	rice	fallow	soybean	fallow	maize	fallow	common bean	fallow	rice	fallow	soybean
System II:	soybean	common oat	maize	common bean	rice	castor bean	soybean	sorghum	maize	crambe	common bean	wheat	rice	wheat	soybean
System III:	soybean	pearl millet	maize	pigeon pea	rice	sunn hemp	soybean	pearl millet	maize	lupine bean	common bean	pearl millet	rice	sunn hemp	soybean
System IV:	soybean	*Brachiaria Ruziziensis*	maize	*B. Ruziziensis*	rice	*B. Ruziziensis*	soybean	*B. Ruziziensis*	maize	*B. Ruziziensis*	common bean	*B. brizantha*	rice	*B. brizantha*	soybean

Evaluations: **microbial biomass (chloroform fumigation-incubation) and mineralizable carbon (aerobic incubation at 50% water-filled pore space and 25 °C for 24 days).** **Statistical analyses:** **Means were compared by the t test (LSD) at a probability level of 10%.**

RESULTS

Source	Minealizable C (mg kg	SMBC (mg kg
	0 to 5 cm	
System (S)		
I	490.0a	881.8b
II	491.1a	852.2b
III	501.7a	886.1b
IV	586.3a	1080.6a
Amendment (A)		
Control	417.0C	832.6B
Silicate	507.8B	893.3B
Lime	627.5A	1050.0A
	Probability > F	
S	0.20	0.08
A	<0.001	0.005
SxA	0.80	0.35

Source	Minealizable C (mg kg	SMBC (mg kg
	5 to 10 cm	
System (S)		
I	205.0a	444.7a
II	224.4a	390.0b
III	238.2a	419.2ab
IV	234.0a	459.2a
Amendment (A)		
Control	210.0A	414.2A
Silicate	237.0A	415.0A
Lime	229.4A	455.6A
	Probability > F	
S	0.21	0.07
A	0.42	0.33
SxA	0.46	0.71

Source	Minealizable C (mg kg	SMBC (mg kg
	10 to 20 cm	
System (S)		
I	128.4a	255.6a
II	122.2a	276.3a
III	142.3a	288.5a
IV	128.1a	275.3a
Amendment (A)		
Control	136.0A	280.1A
Silicate	129.8A	269.1A
Lime	125.0A	272.5A
	Probability > F	
S	0.51	0.30
A	0.56	0.80
SxA	0.52	0.82

CONCLUSION

- **Crop rotation had little effect on soil microbial properties, except at 0-5 cm, in which forage was important to enhance microbial biomass.**
- **Acidity amemdment enhanced mineralizable C and microbial biomass only at 0-5 cm. Lime was more effective than silicate.**