

# Soil carbon contents in integrated crop-livestock-forest systems

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## Introduction.

Pasture and soil degradation in Brazil are the main constraints in conventional systems to animal and grain production. Soil quality in terms of carbon content in these soils is a useful tool to estimate sustainable production. In this study is presented results of 7 years of integrated crop-livestock and crop-livestock-forest systems on soil carbon contents in a clayed Oxisol of the Brazilian Cerrado.

## Material and Methods.

The field experiment was carried out in an area of degraded pasture (20° 26' S, 54° 43' W, 530 m asl) at Embrapa Beef Cattle Research Center, Campo Grande, MS, Brazil since 2008/09. Details are explained in Oliveira et al. (2012), and Pereira et al. (2014). Treatments included ICL (integrated crop-livestock, no trees), ICLF14 (integrated crop-livestock-forest with single line of trees, 14 m apart) and ICLF22 (lines of trees 22m apart). Soybeans were cultivated conventionally in 2008/09 and no-till in 2012/13. Grazed pastures of *Brachiaria brizantha* cv. BRS Piatã were cultivated between eucalyptus trees, after soybeans. Two transects lines, composed by 10 single soil samples/transect, were taken yearly in May-June, to 20 cm depth, and analyzed for total C in an autoanalyser (Sumika/Shimadzu).

## Results and Conclusions.

Over a 7 years period, soil under ICL, showed a positive trend and highest values of total C content as compared with ICLF14 or ICLF22 (Table 1). ICL system (no trees) had less competition for light, water and nutrients, and provided greater source of organic matter for soil carbon, than grass/pasture combined with trees. Availability of total grass biomass in ICL appears to be a better source of organic matter, specially root mass, in order to increase soil carbon contents.

Table 1. Soil C contents to 20 cm depth under different integrated systems 7 years after establishment. Data are means of 8 replicates/treatment/year.

System	Years								
	2008	2009	2010	2011	2012	2013	2014	2015	Means
	<b>g C /100 cm<sup>3</sup></b>								
<b>ICL</b>	2,19a	2,34a	2,39a	2,46a	2,68a	2,57a	2,69a	2,63a	2,51a
<b>ICLF14</b>	1,56b	2,07b	1,88b	1,98b	2,03b	2,08b	2,01b	2,02b	1,98b
<b>ICLF22</b>	1,83c	2,35a	2,21a	2,18b	2,51a	2,30c	2,33c	2,31c	2,28c
<b>Means</b>	<b>1,86</b>	<b>2,26</b>	<b>2,16</b>	<b>2,21</b>	<b>2,41</b>	<b>2,31</b>	<b>2,35</b>	<b>2,32</b>	<b>2,26</b>

## References

Oliveira et al. (2012). Anais do XXII Congresso Brasileiro de Zootecnia, Cuiabá, MT, Brazil.3p. Pereira et al. (2014). Proceedings of Tropentag 2104, Prague, Czeck Republic.4p.

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