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Twenty years of cropping systems and their effects on soil aggregation in the Brazilian Cerrado

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Introduction The adoption of practices based on the conservation of soil and water may improve soil structural quality upon conversion of conventional tillage system to no-till. In this presentation, we report the results of 20 yr of cropping after this conversion in the Brazilian Cerrado.

Material and Methods

The field experiment was installed in an area of Unesp (21º15' S e 48º18' W; 595 m asl), Jaboticabal-SP in 1988. Treatments included nine cropping systems with maize, six continuous cropping under no-till and three under conventional tillage system (disc harrow, disc plow, moldboard plough). Soil samples were taken from the 0-5 and 5-10 cm depth in each management treatment in October 2008, for determining the stability in water and organic carbon content.

Results and Conclusions

Table 1. Organic carbon (SOC), Degree of clay flocculation (DCF), Weight diameter aggregates (WDA), Geometric mean diameter (GMD), Water stable aggregates (WSA) and percentage of stable aggregates > 2 mm (PSA) under different crop systems 20 years after establishment. Data are means of 3 replicate plots.

Crop Systems	SOC	DCF	WDA	GMD	WSA	PSA > 2,00mm
	g kg^{-1}	%	mm		%	
	Soil layer (0,0 - 5 cm)					
No-till 1	24,17 Aabc	54,32 Aabc	4,91 Aa	3,77 Aab	69,50 Aab	82,74 Aa
No-till 2	29,33 Aa	63,60 Aa	4,02 Aab	2,71 Abc	68,17 Aab	67,33 Aab
No-till 3	22,67 Abc	52,17 Abc	5,12 Aa	4,23 Aa	74,50 Aa	86,50 Aa
No-till 4	26,50 Aab	60,48 Aab	4,86 Aa	3,85 Aab	67,00 Aab	82,00 Aa
No-till 5	26,33 Aab	57,34 Aabc	4,58 Aab	3,49 Aab	69,67 Aab	77,47 Aab
No-till 6	26,00 Aab	59,77 Aab	4,98 Aa	4,06 Aab	68,17 Aab	85,06 Aa
Moldboard plough	14,67 Ad	53,00 Abc	2,35 Ac	1,43 Acd	44,50 Ac	38,00 Acd
Disc Plow	14,50 Ad	47,40 Ac	1,63 Ac	0,86 Ad	42,83 Ac	24,27 Ad
Disc harrow	18,50 Acd	48,29 Ac	3,19 Abc	2,00 Acd	54,33 Abc	53,07 Abc
	Soil layer (5 – 10 cm)					
No-till 1	16,00 Ba	45,59 Ba	3,89 Ba	2,17 Bab	60,17 Babc	56,52 Ba
No-till 2	17,00 Ba	45,94 Ba	2,90 Bab	1,78 Bab	60,17 Babc	47,80 Bab
No-till 3	17,17 Ba	43,64 Ba	3,63 Ba	2,40 Ba	61,33 Bab	61,33 Ba
No-till 4	17,50 Ba	42,88 Ba	3,18 Bab	1,94 Bab	58,83 Babc	53,10 Bab
No-till 5	17,67 Ba	49,46 Ba	3,89 Ba	2,68 Ba	70,67 Aa	65,73 Ba
No-till 6	18,00 Ba	50,22 Ba	2,84 Bab	1,74 Bab	63,17 Aa	47,67 Bab
Moldboard plough	15,50 Aa	44,16 Ba	2,93 Aab	1,89 Aab	45,67 Abc	48,33 Aab
Disc Plow	15,33 Aa	45,72 Aa	1,77 Ab	0,96 Ab	46,33 Abc	26,38 Ab
Disc harrow	19,00 Aa	42,69 Aa	3,49 Aa	2,28 Aab	58,67 Aabc	59,55 Aa

Values followed by the same letter are not significantly different by Tukey test (P <0.05) compared. Letter upper layers within the same management system, lowercase letters compare management systems within the same layer.

The adoption of a no-tillage system improves soil aggregation and its stability. The aggregation indexes differentiated the no-tillage systems to conventional systems, with higher values on no-tillage systems in the layer 0-5 cm.

References cited

Candan & Broken (2009), Geoderma. n.154, p. 42-47.