

COMPARISON OF GRAVIMETRIC WATER RETENTION AT DIFFERENT TENSIONS OBTAINED BY THE SNLCS-EMBRAPA AND NSSL-USDA LABORATORIES

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Abstract

Gravimetric water at different tensions was determined by the Soil Laboratory of the Serviço de Levantamento e Conservação de Solos, (SNLCS-EMBRAPA) and by the National Soil Survey Laboratory (NSSL-USA). Fifteen B subhorizons (Bo1 or Bo2 or Bo3) previously selected from Brazilian Oxisols studied during the VIIIth International Soil Classification Workshop (ISCW) were studied. The SNLCS soil laboratory used sieved samples and the NSSL used the clod method for determining the gravimetric water at 1/10 and 1/3 bar. The results for the soil studied are practically the same, as shown by the correlation coefficients ($r=0.97$ and 0.99 respectively). For the gravimetric water retained at 1 and 15 bars, both soil laboratories used sieved samples, and the results once again were practically the same ($r=0.99$ for both). In conclusion it can be said that for the B horizons of Oxisols similar results are obtained by the clod and by the sieved methods.

Data from 15 subhorizons (Bo1 or Bo2 or Bo3), one from each Brazilian Oxisol discussed and analyzed for the VIIIth ISCW, were taken for the present comparative study.

The analyses of the soil samples were simultaneously performed by both the soil laboratory of the SNLCS, EMBRAPA and the NSSL, Lincoln, Nebraska, United States.

The main objective of this paper is to compare the analytical results obtained by both laboratories which used different methodologies for 1/10 and 1/3 bar, and the same methodology for 1 and 15 bars.

Materials and Methods

Only B subhorizons of soil profiles classified as Oxisols, previously selected for the correlated studies beyond the routine analysis, were used.

The analytical procedure used by SNLCS is described in *Manual de Métodos de Análise de Solo* (EMBRAPA 1979), and the procedure used by NSSL is described in the Soil

Conservation Service report (1976).

Water retention was determined by both laboratories at 1/10, 1/3, 1, and 15 bars. For the determination at 1/10 and 1/3 bar the NSSL used undisturbed samples (soil clods), while the SNLCS laboratory used sieved samples (fine-earth fraction). At 1 and 15 bars both laboratories used sieved samples.

Results and Discussion

The results obtained by both laboratories are presented in Table 1 and were taken from the paper "Water Retention in B Subhorizons of Some Oxisols" (Oliveira, Almeida, and Paula, this issue) and from the *Tour Guide* of the VIIIth ISCW.

The correlation coefficient for each tension is shown in Table 2. The results obtained permit the following comparison:

1. The water retained (percent weight) at 1/10 and 1/3 bar by the clod method (NSSL) and sieved sample method (SNLCS). For the Oxisols studied there is no significant difference between the two methodologies, and the correlation coefficients for the 1/10 and 1/3 bar are, respectively, $r = 0.97$ and $r = 0.99$.
2. The water retained (percent weight) at 1 and 15 bars by both laboratories using the same methodology (sieved samples). The analytical results and the respective correlation coefficient ($r = 0.99$ for both tensions) for 1 and 15 bars indicate that the results obtained by both laboratories are in perfect agreement.

Conclusions

For the Oxisols (B horizons) studied there is no significant difference, statistically speaking, between the clod method and the sieved method at 1/10 and 1/3 bar. For these soils, it seems advisable to use the sieved method at those tensions to save time and money. The results obtained by both laboratories for the water retained at 1 and 15 bars are in perfect agreement. There is no significant difference, statistically speaking, between them.

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Table 1. Data on Gravimetric Water for B Subhorizons of Oxisols Studied at the VIIIth ISCW

Pedon no. VIIIth ISCW	Horizon	Gravimetric Water Content									
		1/10 bar		1/3 bar		1 bar		15 bars			
		NSSL	SNLCS	NSSL	SNLCS	NSSL	SNLCS	NSSL	SNLCS		
		(%)									
1	Bo2	20.1	19.9	17.6	17.6	15.6	16.6	14.5	14.6		
2	Bo1	31.8	33.1	29.4	30.1	26.1	27.4	24.5	25.4		
3	Bo1	18.8	20.4	15.2	14.7	13.2	14.0	11.3	10.1		
4	Bo2	33.8	35.8	31.5	30.4	27.8	27.6	24.6	22.8		
7	Bo2	34.1	32.0	32.1	30.0	25.8	28.7	23.6	23.9		
8	Bo2	34.4	34.6	28.8	28.6	24.9	26.1	22.5	23.6		
9	Bo1	21.2	19.6	16.4	15.9	13.3	13.0	12.2	12.5		
10	Bo2	14.2	13.1	11.1	10.4	8.1	8.4	6.8	7.1		
11	Bo3	35.7	37.6	33.4	31.5	27.9	29.5	26.0	26.5		
13	Bo2	11.4	12.5	9.4	8.6	7.3	7.2	5.7	5.9		
14	Bo2	34.0	39.2	31.4	31.7			24.6	25.0		
17	Bo3	22.3	26.1	21.4	22.1	18.9	19.6	17.2	18.8		
18	Bo	34.7	32.3	30.6	29.2	26.6	28.0	24.6	25.7		
20	Bo2	34.0	33.3	31.8	30.6			24.8	26.1		
22	Bo1	29.2	29.2	24.9	24.2	19.6	20.2	15.1	17.3		

Source: NSSL, Lincoln, Nebraska, and SNLCS-EMBRAPA, Brazil.

Table 2. Correlation Coefficients for Pairs of Data at Four Tensions

X	Y	Correlation Coefficient (r)
SNLCS	NSSL	
1/10 bar	1/10 bar	0.97
1/3 bar	1/3 bar	0.99
1 bar	1 bar	0.99
15 bars	15 bars	0.99

References

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