Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2016, 8(3):490-492

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Contribution of studying the influence of cultural practices on structural stability and organic soil potential on the plain of Annaba, "North East of Algeria"

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ABSTRACT

Aggregate stability has been proposed as an indicator of soil quality due to its importance in the physical degradation and its sensitivity to organic matter content. The aim of our contribution is showing the influence of cultural practices on structural stability and organic soil potential in the region of Annaba "The North East of Algeria» The comparative study is made between station which has been to traditional tillage and reduced tillage practices soil protection against cultural practices for at least five years. The results show that in soils subject of traditional tillage, the organic matter is more important, the reaction is slightly acid but the structure is less stable. On the other side in soil of the reduced tillage, the content of organic matter is higher in the surface than in depth also that the structural stability remains higher in surface than in depth. The results of our study showed that farming practices causes changes in the structure and concentration of organic matter in the soil.

Key words: cultural practices, structural stability, organic potential physical degradation.

INTRODUCTION

Many studies have highlighted the impacts of intensive tillage and their traffic on soil structural stability [1], [2], [3] soil pore characteristics [4], [5] and consequent influences on soil functions [6]. The structural stability of soil depends on many factors (type of constituents, texture, previous crops, etc.) in particular, the quality and the level of organic stocks. If the effect of organic matter contents on the structural stability of tropical soils has been repeatedly studied in the laboratory [7], [2]. Several contextual elements reborn the issue of relations structural-organic matter in the soils. On one hand, various studies have shown that the reduction in levels of soil organic matter grown since the last decades. These findings reactivated within the agricultural profession as in various institutions, the application of objective criteria for evaluating the content of organic soil materials.

Furthermore, there is a questioning of traditional cropping systems and diversification of practices and cropping systems (working methods of the soil, intercropping, low-input agriculture, organic farming, etc.). These management methods can have an impact on soil organic matter. It follows an application for assessment of their effects on the structural stability, and the questions here are about the relationship between quality of soil organic matter and structural stability [8].

The purpose of our study is to highlight the effect of tillage and its impacts on the organic potential and the structural stability of the soil. Comparing tilled soils and soil without plowing.

EXPERIMENTAL SECTION

This study was conducted at the plain of Annaba, "the extreme north-eastern Algeria 600 km east of Algiers", just to the west plain of El Hadjar, which extends over an area of 7980 ha, is located south-west of the wilaya of Annaba

(East of Algeria). It is bordered from the north by " Jebel Beliéleta" south by massive sandstone" Ain Berda", to the west by Lake" Fetzara" and east by "Wadi Seybouse", this region is characterized by a Mediterranean climate, characterized by a wet period that runs from October to May, and a dry period that lasts until the rest of the year.

1.1. Soil sampling:
Soil sampls was taken in farm "Bourjiba" at "El Hadjar" near to the industrial area. Soil samples were taken: 5 stations in 2012 and 3 stations in 2013 (some of the taken from reduced tillage, others from reduced tillage) and at varying depths between (0 to 40 cm). The samples are taken with an auger.
1.2. Analytical methods:
1-The pH was determined by electrometric measurement (AFNOR Norm X 31- 103) in the supernatant solution of a mixture soil / liquid in the proportion 1/5 with a pH meter with a glass electrode.

The study zone taken by satelite

2-Wetness: wetness has been dried for 24 hours at 105 ° C in the oven.
3-Porosity: The determination of the total porosity of small aggregate, dry leading to the evaluation of the textural porosity or estimating the minimum porosity in the assembly [9].
* The bulk density: Knowing that the soil bulk density ranges from 1.00 g / cm3 and 1.80 g / cm3. It represents the total mass of the aggregate / total volume of the aggregate; "D A" indicates the status or condition of the soil decreases with the content of soil humus [10], [11].
* Actual density: It expresses the density of the solid phase constituents of the soil, "DR" is the mass of the solid / solid volume, it is generally between 2.5 g / cm3 and 2.6 g / cm3 [12].
4-Structural stability test: the structural stability test performed according to the procedure described with yves le Bissonnais [13].
5-Organic carbon: was determined by the method Anne (Norm AFNOR X 31-109[172], and the organic was determined matter using the formula (M0% x C = 1.72).

RESULTS AND DISCUSSION

The comparative study between a station that has undergone a conventional tillage (CT) system and usual farming practices and soil have been protected against cultural practices (reduced tillage) (RT) for at least five years. The results show that in soils subjected to CT, burial of organic matter is more important, the reaction is slightly acidic but the structure is less stable.

As a result in reduced tillage soils we find a higher organic matter content in surface and depth, and structural stability remains important surface and depth.

The highest values of porosity are obtained in the surface layers of plowed soil. We arrive at the same conclusions made by Claude et al [14]. We can explain this by the returns made as conventional tillage and fragments the soil as a result helps to aerate the soil, against the reduced tillage minimize soil aeration effects.

Table1: Table of results

depth	type of tillage	PH	H%	real density (g/cm3)	bulk density (g/cm3)	Porosity %	C %	OM%	structural stability (mm)
0-5 cm	CT 2012	6.72	9.89	1.66	1.44	32	0.98	1.68	1.76
5-20 cm		6.67	8.46	1.46	1.24	16	1.44	2.47	1.79
20-30 cm		6.68	9.64	1.82	1.55	14.83	1.75	3.01	1.94
0-20 cm	RT 2012	6.64	6.17	3.42	1.25	63.45	1.26	2.16	2.74
20-40 cm		6.78	5.48	1.64	1.54	6.09	1.07	1.84	3.05
0-20 cm		6.80	7.77	1.57	1.24	22	0.95	1.63	3.15
0-20 cm		6.96	7.06	1.49	1.28	15	1.07	1.84	3.06
20-40 cm		6.92	7.29	1.89	1.73	9	0.73	1.25	1.70
0-20 cm		7.12	10.52	2.53	2.07	19	1.35	2.32	2.36
0-20 cm	RT 2013	8 .33	24	1.87	0.47	73	0.52	0.90	1.91
20-40 cm		8.39	27	1.65	0.48	69	0.69	1.09	1.68
0-8 cm		8.16	27	2.07	1.07	43	0.47	0.81	1.85
8-28 cm		8.39	42	1.30	0.64	64	0.60	1.03	1.8
0-20 cm	CT 2013	8.22	0.60	1.72	0.62	65	0.43	0.74	1.27
20-40 cm		8.26	0.47	1.76	0.42	48	0.41	0.71	1.27

We find that the concentration of carbon in the 1st station is weak in its surface and higher layer in the deeper layers. It is noted that the carbon percentage is higher in the first layers and lower in the deeper layers of unplowed stations. Comparing the organic matter content in all samples we observe that it is generally low to medium, depending on the classification of organic matter. [15]

Based on our results we can deduce that our land has a strong structural stability as the values of weight average diameter are between (1.70 and 3 mm).

CONCLUSION

Depends on our results, we can concluded that organic matter is an important bonding agent in the aggregation process, and that it has a big importance for the structural stability and aggregates stability. The Intensive tillage causes shear rupture effects, altering soil behavior.

Acknowledgments
This work was performed at the Laboratory of soil research and development, Department of Biology - Badji Mokhtar University Annaba, Algeria. We sincerely thank all those who contributed in one way or another in the development of this work

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