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THE SPATIAL APPORTIONMENT PEDOGENETIQUES SOILS PROCESSES IN WADI RIGH (NORTH EASTERN SAHARA) VALLEE A MINERALOGIQUE APPROACH

BOUMARAF Belkacem*
Master Wizard at University of Biskra, (Algeria) BP 336 RP 07000, Biskra, Algeria: 21362100248, fax: 21333745091
email: boumaraf.belkacem@yahoo.fr

BENSAID Rabah
Professor in the Department of Agronomy, University of Skikda, 21000. (Algeria) such: 21379128331,
email: bensaidrabah@yahoo.fr

MARRE Alain
Professor laboratory GEGENA, geography, University of Reims 57 rue Pierre Taittinger 51096 Reims Cedex (France),
such /fax: 33 (0) 3 26 91 36 88, email: alain.marre@univ-reims.fr

Abstract: This region study highlights four topographic levels who each own characteristics. A mineralogical analysis made from soil profile combines characters geomorphological, soil and hydrogeological specific to each of these levels. It is from this allocation that characterized the distribution of landscapes and agricultural crops.

Key words: Sahara, geochemistry, arid, salinity, clay minerals

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INTRODUCTION

The modern soil characterization stems first and foremost the nature of the pédogenèse which caused and pédo-climatic conditions which President for their operation however certain analytical processes are incompetent to accumulations saline and particularly gypseuses soils (on-splitting particle size, the determination of exchangeable bases and gypsum...) a full scan combining the scalable aspect of these related to the former and current environment through geomorphological statements soils physico-chemical and mineralogical. This study highlights from soil septic characters geomorphological, soil and mineralogical specific to each of these (UNDP, 1971) levels. It is from this allocation that characterized the distribution of landscapes and agricultural crops. In the North-East of the Sahara, "The Wadi Righ Valley" is called a region, long 150 km and North-South direction, stretches of Umm Thiour to El Goug. This region, arid climate and sedimentary geological formations allows with water depth to a culture of quality dattiers Palms has made famous. This Valley is limited to the West by a succession of storied glaze and East by the Souf belonging to the Grand ERG Oriental dunes. The bottom of the Valley

* Corresponding Author

consists of a string of depressions occupied by a small chotts. During exceptional wet periods, a flow can be done. From a chott across he wins, in the North, the great depression occupied by chotts Mérouane and Melrhir.

The Wadi Righ Valley climate

the dry period spans all year round. The average annual precipitation is 69 mm (1975-1998 period). Most dry months remain June, July and August with an average of 1 mm of rain. More wet month is March with 12 mm. The average annual temperature is 21° C with the temperatures during the months of June, July and August (40° on average). The lowest temperatures are recorded during the month of January (on average 10°). During the period from April to July, the sirocco winds blow very hard.

Geology and hydrology Oued Righ Valley

The Wadi Righ region is included in a set called down Sahara. It is a vast more than 400,000 Km2 is slowly to 200 - meters basin 300 m altitude on slightly inclined of Mdimegh Zab West, Tademait and the Tinghert Hamada to the South and the Tunisian Dahar trays to Eastern.. To the North, the aurès mountains and the Némenchas channel dominate this basin. This is a crétacée aureole constituting trays ceinturent Central depression. Tertiary and Quaternary training occupy the central part. Among them, ERG East Grand sands extend over a large surface area. Topographic North-South still appears one axis. He joined the Wadi Djedi gutter and is flagged by fossil WAD Mya and Igharghar valleys to the South and Righ to the North. In this part of the Sahara, there are three aquifers (Nesson, 1971):

1 - Groundwater of the continental interlayer. In the Wadi Righ region, is an artesian slick little loaded in salt (2 g/l) . It is operated only exceptionally

2 - the continental terminal tablecloth. It is at a depth of 125 to 200 and is busiest salt as the previous (8 g/l)

3 - The subsoil water which is operated regularly. Located between 1 and 10 m depth on the other hand in the top level (see): it is virtually non-existent) and very responsible salts (10-15 g/l).

The Wadi Righ Valley landscape

The Wadi Righ region is part of these huge subdésertiques regions extends to the South of the Saharan Atlas and experiencing constant détritiques inputs (9). A study by UNDP (United nations development programme) in 1972 (10) revealed in a first time * four levels: a higher level, an intermediate level, the level of the préchotts (sub salt lac)and chotts (salt lac) (figure 1) level.

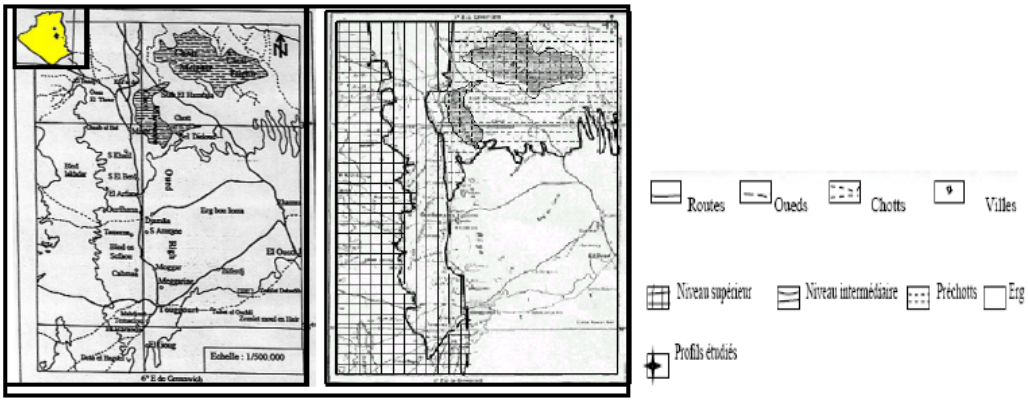

Figure 1. Map geographical and géomorphologique of Wadi physical righ and method for this Valley we adopted a sequential approach following geomorphological variations UNDP, 1970 has identified 04 level geomorphological West to the East On study could not be debited from soils at chotts due to the permanent

presence of the salt water or salt blooms. For each studied level, several surveys were conducted and at least two representative soil profiles were analysed. Each studied level is represented by its profile type with, in all, four described profiles and scanned. (table 1). Soil analyses were conducted on the particle size, total limestone, pH (1/2.5), electrical conductivity (EC 1/5) and gypsum. Mineralogical analyses with their respective processing (Robert and Tessier, 1971) this are plotted samples based on the position of the horizon and physico-chemical results already obtained (table 2).

Table 1. Physico-chemical and mineralogiques rezults of prelevements analyzed

	depth (cm)	particle size %				$CaCO_3$ %	Gypse $CaSO_4,2H_2O$ %	pH	Electrical conductivity CE (1/5) dS/m
		SG	SF	LG	LF+A				
higher level	0 - 15	22	48	19	12	1,2	16,4	7,6	6,2
PS1	15 - 40	39	24	28	09	8,6	13,5	7,8	4,4
	40 - 82	38	26	23	13	14,4	9,2	7,6	4,6
	82 -120	32	21	30	15	19,5	14,4	7,9	5,2
intermediate level PI 1	120 – 145	16,8	18,5	27	37,6	18,2	27,52	8,2	15,5
	0 - 33	7	53 ,5	29	10,5	5,88	16,5	7,7	16,33
	33 - 65	9	44	34,5	12,5	1,14	27,4	7,9	7,94
	65 - 98	14	31,5	63,9	18,4	2,2	36,8	7,7	7,56
	98 –111	17	41,5	26	15,6	1,8	31,4	8,1	8,88
	111-144	24	33,5	28	14,5	2,1	24,4	8	13,39
level of the préchotts PP	0 - 2	18	31,5	34	16,5	0,7	20,7	8,2	41,44
	2 – 25	16.5	28	32,2	24,3	2,1	26,22	8,1	19,6
	25– 55	9	2,5	38	28,5	1,1	11,4	8,4	33,77
Erg PE	0 - 45	12	80	2	6	2,66	17,26	7,7	8,72
	45 - 80	56	34	4	6	1,77	14,6	7,8	6,54

SG: sand coarse
SF: Sandy
LF: coarse silt
W + A: thin silt + clay

Very abundant	++++
Abundant	+++
Moyen	++
Faible	+
Trace	~
Absenc	-
True Smectite	+V
Smectite of transformtion	+T
Instratification	Inst

Table 2. Physico-chemical and mineralogiques rezults of prelevements analyzed

		Principaux mineraux (fraction < 2µm)													
profil	Profondeur(cm)	Calcite	Dolomite	anhydrite	Quartz	Gypse	Attpulgite	Sepiolite	Kaolinite	Illite	Chlorite	Smectite	Instr 10-14S	Inst 10-14C	Inst 7-10I
PS1	0 - 15	+++	+	+	++++	++++	-	+	++	++	+	+	+	-	-
	40 - 82	+++	+	+	+++	+++	-	-	++	+	+	+T	+	-	-
	120 -145	+++	+	+	+++	++	+++	~	++	+	++	+	++	-	-
P1I	0 - 33	+++	~	~	++++	+	-	+	+	+	-	++ T	-	-	-
	111 -144	+++	+	~	++++	+++	++	-	++	+	+	++	-	-	-
PP	2 - 25	++	~	-	++++	++++	-	-	++	+	+++	+++V	-	-	-
	25 - 55	++++	-	-	++++	+++	-	-	++	-	+++	+++V	-	-	-
PE	0 - 45	++++	+++	-	++++	++++	+	+	+++	+	-	-	-	-	+
	45 - 80	+++	+++	-	+++	+++	+	-	+	+	~	+	+	-	+

Results and interpretations:

By superimposing each géomorphologique level x-ray results we engage to each mineral the following facts:

-The Quartz, gypsum and the calcite are distinguished of the diffractogrammes minerals. From most recent corruption these minerals are mobilized and tabled by wind on spaces that far exceed the limits of the Valley. And a less important way of accessories minerals as the dolomite - the gypsum is the product of a particularly most recent néoformation in the middle tier and préchotts due to the presence of a rich in sulphate tablecloth and head of this massive deposit. The calcite néoformation would rather the product of a process related to prior to néoformation the gypsum and expense low this dolomite and clays, probably bioclimatiques conditions particularly in the top level.

-The Kaolinite is undoubtedly a legacy of alteration product previous kaolonisante because the current environment of these regions is never enough lessivé and déssaturé to allow the genesis of the kaolinite, if its intensity in studied profiles is relatively stable it is differential sedimentation which she was born is a rich bases where environment this mineral was no reason to be corrupt.
-The Illites follow the same mode of training (inheritance) kaolinite probably from the muscovite present in some samples procession however its content in almost all of the diffractogrammes remains low, because in most cases, this Illite provided by the parent rock is an open Illite (Paquet,

1966) and its corruption would continue in soils or because its possible transformation into the layout drawn by Lucas Montmorillonite (1964) and which is incompatible with the climate context Saharian, or is due to a concentration High + K in soil with a mechanism solution paradoxical that degradation of this mineral (Halitim, 1994).

-The presence of a derived Montmorillonite processing in the top level and in the middle tier to the side of néoformation (true Montmorillonite) can be misleading for a side that there is not a single supplier in this mineral and on the other hand this leads us to believe that this mineral might not come originally from emerging training in this region, his presence in these levels is mainly linked to the wind action. The presence of a transformation in 1I and 2I in absence of this transformation witness polls Montmorillonite is a say illite - instratifications Montmorillonite (10I - 14 S) strengthens the ideal of détritique origin of this mineral in the level of residual training could occur at the heart of the diagenèse during earlier climate phases.

CONCLUSION

In light of mineralogical results on the samples taken different geomorphological levels apparently distribution of clay in this landscape minerals obeys exclusively to a mode of distribution managed by the wind which the extent of its action in this Valley has been studied through scanning carried out analytical morpho considers as a néoformée in arid regions, the attapulgite in Wadi Rhir Valley mineral is transported by the wind in the form of dust partire desert training and subdésertiques bordering (Gaussen, 1984) his presence in the survey carried out at the ERG and its absence in recovery at the top level sands is obiessent not has a special at the underground in the middle tier horizons presence however determined mechanism is due mainly to preferential conservation for this fibrous mineral (Dutil, 1971) Middle. The place which the environment is most likely caused the attapulgite néoformation would his ante-villafranchien training in the top-level elsewhere; it would be rather original détritique.

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