



# Status of Black Soil in the Eastern Mediterranean

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## The Eastern Mediterranean Sea

- Located in the eastern corner of the Mediterranean Sea
- Submitted to Mediterranean climate condition with mild wet winter and hot dry summer
- Xeric soil moisture regime and and thermic temperature soil regimes
- The soil is red Mediterranean (terra rossa) with red color and poor of organic carbon and high of carbonates



- ❖ In general, the climate conditions are not favorable conditions for the deposition and accumulation of organic matter, which is the major soil forming process of Black soil
- ❖ Nevertheless, black soils still occur on a tiny scale and their occurrence is exciting
- ❖ Theories on their formation in the Mediterranean region are not in general agreement

# Literature Overview of Black Soil in the Eastern Mediterranean

- **Reifenberg** 1949 described this as soil with small organic epepedon and attributed the immaturity of these soils to the high erodibility of the disintegration products of soft limestone.
- **Durand and Dutil** (1971) postulated that the texture of soft and hard limestone is crucial in the development of both types of soils.

## Lebanon

- **Gezeb** (1956) highlighted the occurrence of a Rendzina in Lebanon,
- **Tarzi and Paeth** (1975) found that Rendzina derived from soft limestone which can be found in the foothills of the Lebanon and Anti Lebanon Mountains. They also found that these soils had a significantly higher availability of P and CaCO<sub>3</sub> than any other soil.

## Syria

- These soils have been studied by Muir (1955), Nahal (1962, 1981), Van lier (1965), Zain al Abdeen, (1978), Chalabi (1980), Ilaiwi, (1983).
- Nevertheless, most of these studies were brief and not in-depth or detailed, as they only investigated the soil properties without addressing the origin and the factors of formation.

## Jordan

- **Moormann** (1959), remarked that in the best soils of Jordan, the (A) horizon is very weak and almost absent of humus in the upper horizon (values seldom exceed 1 or 2 %).
- **The survey of Ministry of Agriculture** (1995, 1995) found that the black soil of Typic Calcixerolls, Lithic Haploxerolls, Vertic Haploxerolls, and Typic Haploxerolls could be found in minor occurrences, mainly in the higher hilly areas of Jordan such as in Um Qeis, East Nueimeh, Ajlun and Salt Subiehi.
- **Khresat** (1999) pointed out that Mollisols have developed from Quaternary deposits in northern Jordan under xeric moisture and thermic temperature regimes in the 450 mm precipitation zone.
- **Lucke et al.**, (2005, 2008, 2012) found that Rendzic Regosols developed on limestone regolith in the Abila ruins in northern Jordan and that these soils show very weak soil development

## **Current Status of Black Soil in the Eastern Mediterranean**

The investigated black soils in the Eastern Mediterranean could be divided depending on their genesis into two soil types:

- 1- Calcareous black soil (Rendzina)** on littoral plains and hilly areas,
- 2- Hydromorphic black soil,**

# 1-Calcareous Black Soil (Rendzina)

- These soils occur in a humid and sub-humid Mediterranean climate, with annual precipitation exceeding 800mm,
- Can develop on limestone, sandstone, chalk, dolostones, and similar calcareous materials,
- Characterized by a darker color of the surface horizon due to the accumulation of organic matter in O- A or A horizon,
- Have a high content of organic carbon as well as carbonate as the entire soil profile,
- The high content of calcium carbonate content kept the soil almost completely base saturated, retarding weathering and subsequent release and redistribution of sesquioxides and silica,
- Consequently, this soil has a weakly developed, immature profile.

Calcareous Black Soil (Rendzina) is at more advanced development stage.

Soft weathering parent material permits to developing a relatively thick profile, with developing of a primitive illuvial zone or micro B horizon.



**Brown rendzina  
on Lemestone**

**Gresish rendzina  
on Serbantenens**

**Redish rendzina  
on Dolostone**

**Para rendzina  
on steep slope**

Clacic Pachic Haploxerolls Leptic Kastanozem	Typic Rendolls Rendzic Leptosols	Entic Haploxerolls Rendzic Humic Leptosol	Ain Al Beida Calcaric Leptic Regosols

## 2-Hydromorphic black soil

- This soil is the most important in terms of extension and terms of agricultural use.
- The annual precipitation ranges from 500 to 1000 mm.
- The hydrologic conditions play drive role in the evolution and developing, (bad drainage, heavy clayey, very slow runoff.....)

Associated with the extension of the great African-Syrian faults (the dead sea fault) along the eastern coast of the Mediterranean, led to the emergence of many depressions (Jordan valley, Hala Galilea, Houla plain, El Beqaa valley, El Ghab rift valley, El Amuq rift valley).

Water stagnation and very bad drainage had their roles in the accumulation of organic matter on the topsoil to the extent that these soils before the artificial drainage considered as a wetlands





- Field and morphological data show that the soil receives more moisture (ground moisture) than the prevailing moisture regime suggests
- Thickness of mollic, occurrence of carbonate, the level of water ground .....are features assist in soil classification at the lower categories, as such Aquic, Cumulic, Pachic, Clacic pachic, and Typic Haploxerolls are assumed to be largely represented

Joureen Aquic Haploxerolls	Ennab Cumulic Haploxerolls	El Kreem Pachic Haploxerolls	Nbel El Khateeb Calcic Haploxerolls

# Conclusions

- The common belief is that black soil was more prevalent in the eastern Mediterranean. However, it still occurs to a lesser extent in different climatic zones ranging from xeric to aridic,
- This existence under such conditions raises questions on the genesis and forming processes. As well as the conditions that are associated particularly with paleosols and paleoclimate and requires further research.
- The Hydromorphic black soil seems to be the most important in terms of its extension and its agricultural productivity. Its formation is spatially associated with the Great African-Syrian faults. Therefore, it is reasonable to be older than Rendzina.
- Rendzina occurs on limestone, sandstone, chalk, dolostones, and similar calcareous materials, with a dark surface horizon and high carbonate content, keeping the entire soil profile saturated with bases. The soil has a weakly developed, immature profile, and the Proper Rendzina (Typic Rendolls) is predominant.