Some Chemical Properties of Soil From Southern Iraqi Marshes

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Abstract

A study for the evaluation of some properties of soil of certain sites in southern Iraqi marshes Al-Imarah marsh, and Al-Ghebaysh (Central Marsh), Umm El-Neaj and Umm El-Ward (Al-Hewaizah Marsh and Hareer marsh and El-Bargha within Al-Hammar Marsh has been conducted for investigation of their types and suitability for harvesting of certain agricultural crops. Soil samples were collected from each site for a depth of 10 - 90 cm ,and transferred to the lab in Marine Science Centre. In the lab, the following parameters were determined: pH, Electrical Conductivity (EC), Trace Metals (Cobalt, Co, Iron, Fe, Manganese, Mn, and Nickel, Ni, Total percent of Nitrogen, Dissolved Phosphorous, Sodium and Potassium). Moreover, soil texture was evaluated as percentage sand, silt and clay for the detection of the type of the soil Results revealed that pH for the studied soil range between lower value of 7.4 in Ghebaysh and 8.1 in Hareer marsh. Conductivity ranged between lower value 4.59 and higher value 13.16 mS/cm in Umm El-Ward and El-Bargah marsh respectively. Concentrations of studied trace metals were alternative among the sites; lower value was 170.526 μg/g dry weight Ni in the soil of Umm El- Neaj and higher value as 7887.727 μg/g dry weight Fe in the soil of Harrer marsh. The soil of highly enriched with nitrogen 0.621% in Umm El-Neaj and phosphorous 1.42 mg/g in Umm El-Ward, while lower values were 0.420% nitrogen in Al-Imarah marsh and 0.85 μg/g P in El-Ghebaysh. Potassium and sodium were ranged between 4.21- 6.35 ppm and 512.13-661.31 ppm in Al-Imarah respectively. The study revealed that most of the southern marshlands are suitable for planting of different crops.

Key Words: Soil, Features, Southern Iraq, Marshes, Soil Texture.

Introduction

The Southern Iraqi marshes represent an important part of the Southern region Steppe of Iraq; it is called Sahel sedimentary due to deposition of great amounts of salts from Tigris and Euphrates rivers. Marshes of southern Iraq occupies 35000km^2, around 9000 km^2 represent a permanent marshes, which filled covered with water over all the year. Other 9000

are non-permanent marshes filled with water during rain, while the rest is shallow areas and has no water but cover with *Phragmites australis* and *Typha domingensis* (Mahmood, 2008). The soils of Iraqi marshes are unique type among wetlands and semi lands not only for west Asia but overall the world. They are characterized by unique features even they were deteriorate due to desiccation during the period 1991-2003 in which they turned to dry lands and most of people living there were flee to the main cities around. Animals and plants were cut to very low levels, only 10% of the marshland were preserved, 60% were become desert and 30 % were used for agriculture (Van *et al*, 1993)

Chemical elements are exist in all soils, Iron (Fe) is the most abundant element (Savhell,1969) , it is present in the range 0.5 – 5 %, and total Cobalt (Co) in the soil is low and range between 100 and 300 μg/g in the basic rocks and 1 – 3 μg /g in the gypsums rocks (Mitchell ,1972). Copper present in very low quantities, the earth crust contains copper in the range 0.1 – 1 % (Venoqradov, 1959).

The concentrations of chemical elements are altering in the soil depending upon its texture, iron; manganese and nickel are decreased in sandy soil (Hussain, *et al*., 1993; Kovda, 1988).

Lands of Iraqi marshes are characterized as being plain lands some of it is fertile which could be used for planting economical crops while others contains high levels of salts. Most lands of Iraqi marshes are covered with water all over the year, which produce large quantities of rice and corn while *Phragmites australis* and *Typha domingensis* are growing heavily in non-planting areas.

Aim of the study

As marshlands are economically important, this study is aimed at investigation of some physic chemical features for their soils to identify their suitability for agriculture to enhance the

agriculture reality of most field crops specially the cereal crops.

Material and Methods

Sites selected for these investigations are six stations spread among Southern Iraqi marshes as follows: 1. Al-Imarah marsh, 2. Al-Gebaysh marsh within Central marshes, 3.Umm El-Naaj, and 4.Umm El-Ward within Al-Hwaizah marsh, and 5. Hareer marsh and 6. El-Barghah within Al-Hammar marsh, as shown in Figure 1.

Collection of samples

Soil samples from the six stations were collected by special tool within the 20 cm depth, put in plastic bags, transferred in cool box to the labs of Marine Science, and kept in fridge prior to analysis.

Laboratory Analysis

In the lab, soil samples thawed, grinned and pH, EC, total percent nitrogen by micro Kildal (Page et al, 1982) and dissolved phosphorus were measured by adopting standard methods. Chemical elements, Cobalt, iron, manganese, and nickel were determined by adopting the atomic absorption method using Atomic Absorption Spectrophotometer type Pye Unicum SP9, according to Sturgeon et al, (1982) while sodium and potassium were determined by flam photometry.

Results and Discussion

The measured parameters in this study pH, EC, TN, TP and chemical elements Co, Fe, Mn, and Ni in the soils of six different locations within Southern Iraqi marshlands are presented in table 1., while the results of soil texture analysis are shown in figure 2.

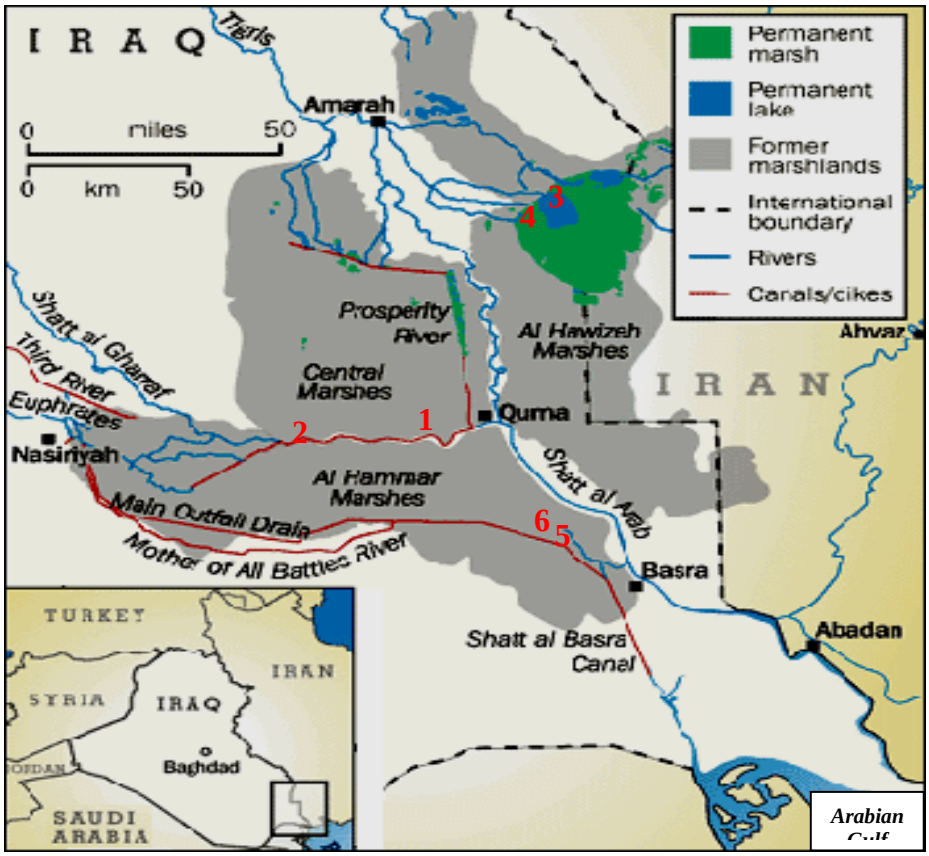

Figure 1. Map of Southern Iraqi marshes showing the locations sampling sites

Table 1. Physico chemical parameters for soil from different sites within Southern Iraqi Marshes

Site / Parameters	1. Al-Imarah	2 El-Chebaysh	3 Umm El-Naaj	4 Umm El-Ward	5 Hareer	6 El-Barghah
pH	7.8	7.4↓	7.5	7.7	8.1↑	7.8
EC (d S/cm)	12.95	6.17	8.35	4.59↓	11.95	13.16↑
Co (µg/g)	351.779	364.752	307.804↓	307.804↓	395.748↑	371.532
Fe (µg/g)	7340.13	7541.895	7468.391	7200.318↓	7887.727↑	7526.546
Mn (µg/g)	721.523↓	884.43↑	730.368	736.074	743.311	736.074
Ni (µg/g)	213.115	341.052↑	↓ 170.526	198.947	193.532	284.21
TN %	0.420↓	0.463	0.621↑	0.511	0.505	0.561
TP (µg/g)	1.03	0.85↓	0.98	1.42↑	1.12	0.94
K (mg/kg)	5.33	4.92	4.21↓	4.74	5.62	6.35↑
Na (mg/kg)	661.31↑	598.52	631.23	600.23	553.42	512.13↓

Table 2. Analysis of soil texture of selected sites in Southern Iraqi Marsh lands.

Site / Parameters	1. Al-Imarah	2 El-Chebaysh	3 Umm El-Naaj	4 Umm El-Ward	5 Hareer	6 El-Barghah
Sand %	12.364	6.3704	5.5052	0.9716	5.274	15.082
Silt %	51.312	62.096	55.664	66.208	63.19	43.424
% clay	36.323	31.533	38.831	32.820	31.534	41.494
Type of soil	Silt	Silt	Silt	Silt	Silt	Silt

As it is maintained in table 1, it is appear that the nature of soils of Southern Iraq marshes directed towards the basicity with a pH range from 7.4 in St. 2 (El-Chebaysh) to 8.1 in st 5 (Hareer), while there are large differences in the electric conductivities EC which range between 4.59 dS/cm in st. 4 (Umm El-Ward) and 13.16 dS/m in st. 6 (El-Barghah). Total nitrogen ranged from 0.413 % in st. 1 (Al-Imarah) to 0.621% in st 3 (Umm El-Naaj), total phosphorus between 0.85 (μg/g**)** in st. 2 (El-Gebaysh) to 1.42 μg/g in st. 4 (Umm El-Ward).

The studied marsh soils were rich in chemical elements, Co reported values between 307.804 and 395.748 μg/g in stations 3 or 4 and 5 respectively, for Fe, the highest values were reported as 7541.895 and 7887.727 μg/g in st. 2 and 5 respectively, while for Mn the lowest value reported was 721.523 μg/g in st. 1 and the highest value as 884.43 μg/g in st. 2, both within Central marsh. For Ni, values were

alternative, the lowest 170.526 µg/g in st. 3 and the highest 341.052 µg/g in st. 2.

On the other hand for K, low values were reported, the greatest were 6.35 mg / g dry weight in st 6 and 5.62 mg / g dry weight in st 5, both within Al-Hammar marsh. For Na values reported ranged between 512.130 mg / g in st. 6 and 661.310 mg / g in st. 1. Those values for K and Na reported in this study do not agree with what reported earlier as 17ppm for K and 100 ppm for Na in soils from stations nearby st. 5 an 6 of this study (Hussain *et al*., 1993).The increased of Na and Kin the soil could be explosion on the basis of marshes desiccation in which salinity is increased in most of standard sites .Moreover ,the standard sites were enriched with aquatic organism before desiccation leading to increased salinity and this results was agree with , (Ali et al ,2012)

Texture analysis shown in table 2 revealed that the texture of most studied soils from the southern Iraqi marshes were contrast in type and site, all showed high percent of clay and low percent of sand, therefore all were classified as soils with a texture of silty soil, accordingly these soils are characterized to be cheap in conservation of nutrients and humidity to be dry very quick and it has good porosity and ventilation, and this results was agree with (Nughamesh and Ali, 2005).

Conclusion

It is concluded that chemical elements are contra verse in values in the soils of Iraqi marshes; Co and Ni were very low compared to Fe and Mn. More over the texture of the studied soils were mostly silt, therefore it classified as silt texture, and this type of soil is the best to be suitable for agriculture of cereal crops. Finally, we recommend using these sites for agriculture to rise the agriculture field in southern Iraq.

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بعض الخصائص الكيميائية لترب أهوار جنوب العراق

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المستخلص

اجريت دراسة لتقييم بعض مواصفات ترب من ستة مواقع موزعة بين اهوار العراق الجنوبية وهي هور الامارة والجبايش ضمن الهور الوسطي وام النعاج و ام الورد ضمن هور الحويزة و هور حرير و البركة ضمن هور الحمار وذلك لتحديد نوعيتها ومدى ملائمتها لزراعة انواع مختلفة من المحاصيل الزراعية. تم جمع عينات بعمق 10- 90 سم من الترب ونقلت الى المختبر في مركز علوم البحار لقياس المواصفات التالية: الاس الهيدروجيني والتوصيلية الكهربائية و تقدير العناصر النزرة التالية : الكوبلت والحديد والمنغنيز والنيكل، وكذلك تقدير النسبة الكلية للنتروجين والفسفور الذائب والصوديوم والبوتاسيوم فضلاً عن تقييم نسجة التربة بتحديد النسب المئوية لكل من الرمل والغرين والطين لتحديد نوع التربة. بينت النتائج ان الاس الهيدروجيني للترب المدروسة تراوح بين ادنى قيمة 7.4 في الجبايش و اعلى قيمة 8.1 في هور حرير ، وتراوحت التوصيلية الكهربائية بين ادنى قيمة 4.59 الى 13.16 مللي سيمنس/ سم في ام الورد والبركة على التوالي. وكانت تراكيز المعادن النزرة المدروسة متفاوتة بين محطات الدراسة وكان ادناها 170.526 مايكروغم /غرام وزن جاف نيكل في تربة ام النعاج و اعلاها 7887.727 مايكروغم/غرام وزن جاف حديد في تربة هور حرير وكانت اعلى الترب اغناءً بالنتروجين هي 0.621 % في ام النعاج والفسفور 1.42 مايكروغرام/ غم في ام الورد وادناها بالنتروجين 0.420 % في هور الامارة والفسفور 0.85 مايكروغرام/غم في الجبايش . وتراوحت قيم البوتاسيوم والصوديوم بحدود 4.21 – 6.35 جزء بالمليون و 512.13 – 661.31 جزء بالمليون في هور الامارة على التوالي. يستخلص من هذه الدراسة ان معظم الارض في الاهوار صالحة لزراعة انواع مختلفة من المحاصيل الزراعية .

كلمات مفتاحية: تربة، مواصفات، جنوب العراق، اهوار، نسجة التربة .