Prediction of Soil Sodicity (ESP) from SAR Values in Various Soil Water Extracts

Tqwim Qlwiyya al-tarba ma nqim al-soudimy maddm y fikyfikat mdhlfta

Thesis Submitted to Sudan University of Science and Technology in Partial Fulfillment of the Requirements for M.Sc. Degree in Soil Science

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Dedication

.......To my lovely Father

.......To my lovely mother

To my Brothers and

....Sisters

....To my Friends

Love you all
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First of all my thanks and prayer are due to Almighty Allah, the beneficent, the merciful for giving me health and strength to accomplish this work.

I am also grateful to my supervisor Dr. Abd Elkarim Elobeid for his assistance, continuous guidance, encouragement, and meticulous attention and patience throughout the course of this study. Also grateful to Sudan University of Science and Technology.

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Abstract

This study was carried out at two locations i.e Sileit Agricultural Scheme and Kenana 4, the samples were taken from different depths. Ninety (90) soil samples were collected from the two areas to represent saline and non saline soils. Samples were tested for:

1. Exchangeable Sodium Percentage (ESP)
2. Total Soluble Salts (E.C.)
3. Sodium Adsorption Ratio value (SAR)
4. pH

The purpose of this study is to determine the relationship between ESP and SAR Values at different dilutions (saturated paste Extract, 1:2.5 and 1:5 soil: water suspension).

This study is to reduce the high cost of measuring ESP which necessitates determination of cation exchange capacity (CEC), extractable sodium, and soluble sodium. They all require chemicals, valuable equipment and human efforts.

Statistical analysis was carried out and regression equations were developed between the measured values of ESP and SAR at different soil: water dilutions (paste extract, 1:2.5 and 1:5). Regression equations were then used to calculate ESP. The relationship between calculated and actually determined ESP values was highly significant for all the dilutions used, including the 1:5 soil: water ratio which is widely adopted in soil laboratories.
أجريت الدراسة لمنطقة مشروع السليت الزراعي وكتانة 4 حيث أخذت العينات من أعمق مختلفة، جمعت العينات ليتضمن أراضي ملحية وغير ملحية (90 عينة). أجريت عليها التحاليل العملية الآتية:

1/ نسبة الصوديوم المتبادل.
2/ الأملاح الكلية الذائبة.
3/ الصوديوم المدمص (عجينة مشبعة 1:2.5، 1:5).

الهدف من الدراسة إيجاد علاقة بين الصوديوم المدمص على سطح حبيبات التربة والصوديوم المتبادل في تخفيفات مختلفة (عجينة التشبع 1:5، 1:2.5). بغرض التخلص من التكاليف العالية لتقدير الصوديوم المتبادل حيث يتطلب ذلك تقدير السعة التبادلية الكبتونية والصوديوم المتبادل والصوديوم الذائبة والتي يحتاج تقديرها إلى مواد كيميائية مرتفعة الثمن واستخدام أجهزة حساسة مع وجود مزيد من الجهد والزمن.

أثبتت الدراسة أنه يمكن إيجاد قيمة الصوديوم المتبادل من قيمة الصوديوم المدمص بعد استخدام المعادلات الناتجة من التحليل الإحصائي حيث تقارب نتائج الصوديوم المتبادل العملية مع النتائج الحسابية.

كما وأثبتت الدراسة أنه يمكن استخدام العلاقة 1:5 في تقدير نسبة الصوديوم المتبادل وهي الأسهل تقديرها من الناحية العملية إذا ما قورنت بمستحضر نتائج العجينة المشبعة.