TECHNOLOGY OF SOIL AMENDMENTS APPLICATION

By

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Approval Sheet

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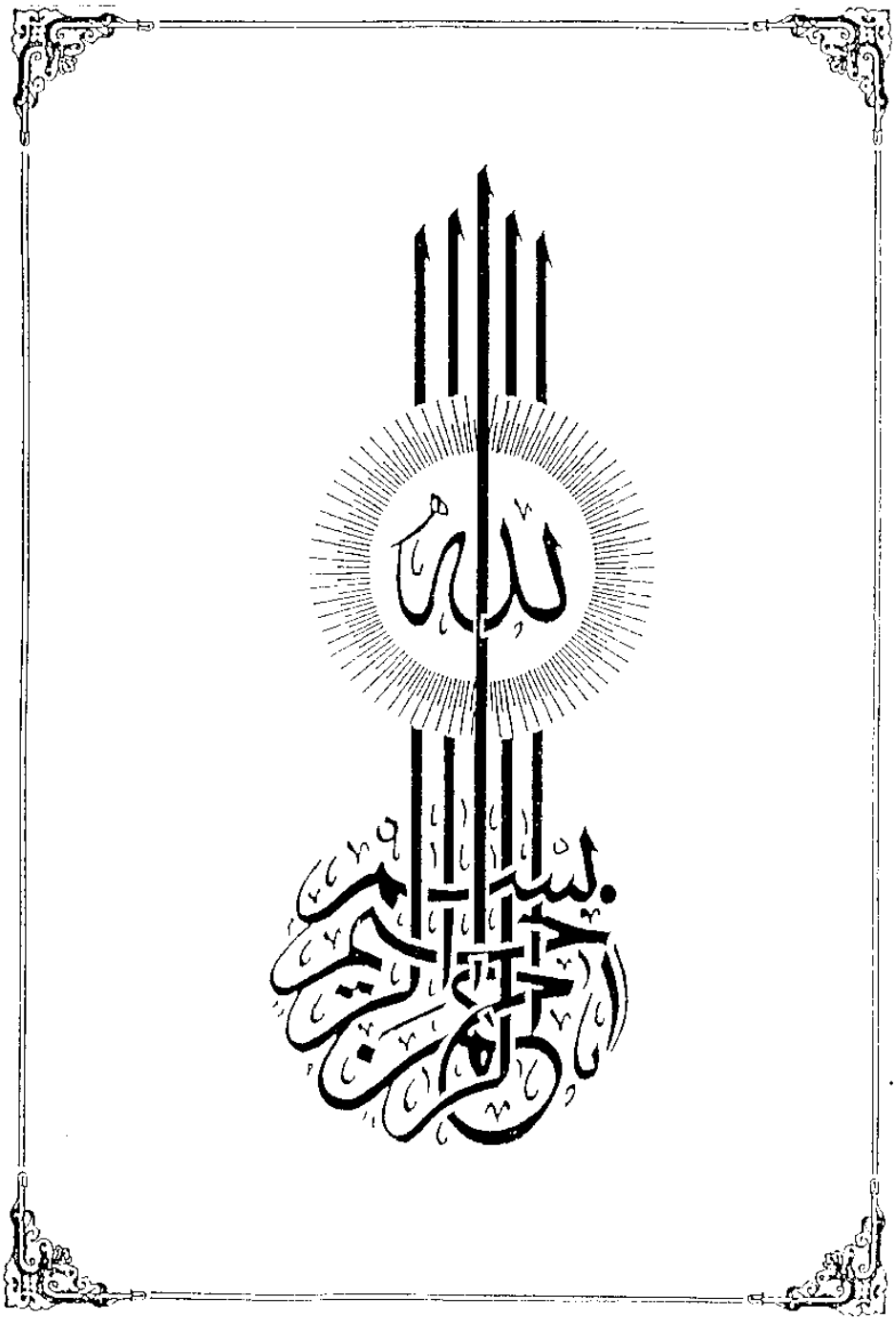

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Abstract

This work aims to study the technology of soil amendments application and leacning process of representative saline-alkali soil sample taken from Tamia Research Farm, Fayoum Governorate.

Data showed that the changes in tne leachate p^H, EC-values, SAR, and $SO_4^{=}:Cl^-$ ratio are seen to be closely related to the amount of recovery ions from soil column. The effect of H_2SO_4 treatments was superior to that of eitner hydro- or gypseous amelioration ones. Data proved also tnat leaching could be set after 3 and 5 PV of LR leached out the drainage system related to H_2SO_4 and gypsum treatments, resp. The best results were eminent from the water app. technique of SR_2 treatment.

The relationship between tne leacnate volume"X_c" cm^3 as PV of LR an liberated ions from soil column "Y_c" under the effect of different rates G and S (g/k_g. soil) of gypsum and H_2SO_4 , resp. could be assessed with the second order equation as follows :

$$Y_c = (0.575 - 0.002\ G)\ X_c - (0.180 - 0.001\ G)\ X_c^2\ \ 10^{-3} \text{ ----------(1)}$$

$$Y_c = (0.540 - 0.003\ S)\ X_c - (0.150 - 0.001\ S)\ X_c^2\ \ 10^{-3} \text{ ----------(2)}$$

The second order equations indicated that acidity amelioration was superior to that of gypseous did. This superiority concurs with a short time of reclamation, reducing application rates of soil amendment and

saving more quantity of leaching water, and hence reduced the total cost of reclamation process.

Furthermore, a gradual increase in sand content was observed as gypsum and H_2SO_4 application rates increased. This increase in sand fraction was much more under the effect of H_2SO_4 treatments than that of gypsum ones. However, water app. SR technique resulted in an increase in sand fraction with 8.4 - 9.75 % more than the initial soil sample. The mean values of $CaCO_3$ % reached to about 15 % and 12.4 - 14.7 % related to gypsum and H_2SO_4 treatments, respectively. The changes in $CaCO_3$ contents were eminent H_2SO_4 application technique and took the descending order of : after leaching app. water app. soil app. treatments. Moreover, high $CaSO_4$ contents were eminent H_2SO_4 treatments and superior to that of gypsum ones. This may be attributed to the generated $CaSO_4$ by the reaction of H_2SO_4 with the existing $CaCO_3$.

Data obtained showed that addition of H_2SO_4 and gypsum followed by 3 PV of LR, changed the final pattern of EC-values of the studied soil to be less and more than 4 mmhos/cm., respectively. Further, the soil pH-values changed from 8.3 to about 8.1 - 7.8 and 8.0 - 7.5 relat to gypsum and acidity treatments. resp. The ESP - values exceeded 20 % and less than 15 % related to gypsum and acidity treatments. resp.

Accordingly, it could be stated that diagnostic features of the tested soil could be prescribed at the end of 3 PV of LR and turned out normal soil under the effect of acidity amelioration process of water app. SR_1, after leaching app. SR_1, and soil app. SR_2 treatments. Meanwhile, it remained moderately saline-alkali soil related to gypseous amelioration process of GR_2 treatments. Whereas, the tested soil was still highly saline-alkali soil under the effect of hydromelioration process.

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1-INTRODUCTION

INTRODUCTION

In order to sustain the whole increase of Egyptian population, in which an annual increase is over a million, the agricultural area has to be expanded in a short time. It is well to mention that more than 1.8 million feddans are placed to the categories of salt-affected soils. The different types of salt-affected soils are seen to be related to the quantity and the quality of soluble salts and their distribution in the soil profile. All systems of these soil groups and classifications are based on various degrees and forms of their salinity and alkalinity .

Saline-alkali soils are known for their deteriorated physical condition due to high content of exchangeable sodium; a characteristic feature of these soils. However, leaching of soluble salts is a severe problem in these soils because of very low infiltration and water scarcity. Moreover, reduction of p^H values and displacement of sodium using chemical amendments is not only expensive but is also time consuming. However, the changes in soil p^H-values are pertinent not only to the type of soil amendments but also to their application rates and technique. Therefore, reclamation process of saline-alkali soil through gypsum and sulfuric acid followed by leaching is feasible in many cases. However, gypsum is the most common amendment used for reclamation due to its low relatively cost although it needs a long time for reclamation. But, sulfuric acid is often cheep enough for field application if it follows the modern technique of application. This advantage may be concurred with a short time of reclamation, reducing application rates of soil amendment and save more quantity of leaching water, and hence reduces the total cost of reclamation process. Understanding the technology of soil amendments application to saline-alkali soils besides the knowledge of different forms

of salt-affected soils in relation to formation and salinization factors could achieve the abovementioned advantages.

In order to reach such a decision, a representative saline-alkali soil sample taken from Tamia Research Farm, Tamia District, Fayoum Governorate and laboratory factorial experiment should be carried out to study the effectiveness of amelioration processes according to the findings obtained by the technology of soil amendments application.

2-REVIEW OF LITERATURE