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# EFFECT OF WATER QUALITY ON SOME PHYSICAL, CHEMICAL AND PEDOLOGICAL CHARACTERISTICS OF SOILS

BY

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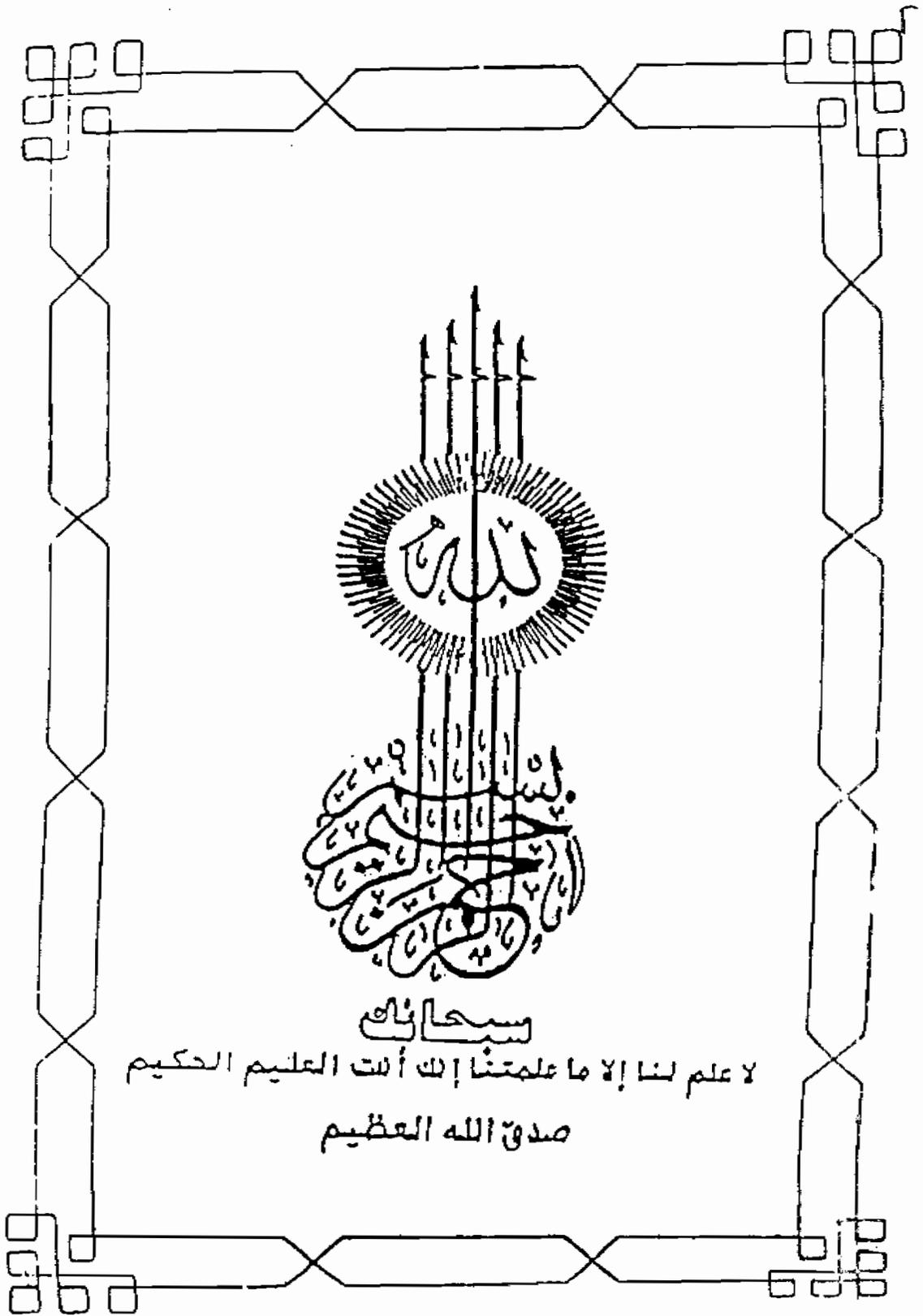
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TO MY MOTHER  
WHO DEVOTED HER LIFE  
FOR  
US

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## INTRODUCTION

In Egypt, irrigation water is mainly derived from the River Nile and its canals which are responsible for irrigating the agricultural lands in the Nile Valley and Delta regions. Very recently, Nile water was also communicated to North Sinai area through El-Salam canal which runs along such area to irrigate newly reclaimed lands at El-Tina plain .

On the other hand, extensive deserts depend largely on the ground water resources for irrigation and agricultural development that helps in the settlement of new communities in these deserts. Nevertheless, lack of irrigation water resources associated with prevailed draught and desertification in Africa necessitates the optimum use of available irrigation water as well as the reuse of additional water resources such as drainage water, sewage, brackish and other low quality water .

It is , therefore, expected that irrigation water quality will affect soil properties thereby contribute , to an indeterminate extent, to the agricultural production. Accordingly, the main objective of this research is to evaluate the effect of using different water qualities on some soil physical, chemical and pedological properties with particular emphasis to Nile alluvial and calcareous soils which are considered the most productive soils in Egypt .

**REVIEW OF LITERATURE**

## 2- REVIEW OF LITERATURE

### 2.1 - Effect of water quality ( EC, SAR and anionic composition ) on some physical properties of soils .

#### 2.1.1 - Hydraulic conductivity :

The application of saline irrigation water is expected to play an active role in affecting soil physical properties especially soil hydraulic conductivity (H.C.). The quality of irrigation or leaching water may affect the salt balance of soils , through its influence on the soil permeability. It is well known that leaching salt-affected soils with waters of low salt content, may decrease the permeability to a value that practically may prevent completion of the reclamation process, while increasing the electrolyte concentration of the water markedly increases the transmission rate . Consequently, effective leaching through maintaining good permeability was achieved which results in reducing the time required for reclamation of such soils . Several studies on the relation between electrolyte concentration of water and permeability are available in the literature .

Quirk and Schofield (1955) studied quantitatively the effect of electrolyte concentration on soil hydraulic conductivity at various levels of exchangeable  $\text{Na}^+$ . They reported that reclamation must ensure clay colloidal stability by maintaining an electrolyte concentration compatible with the ESP value of soil under reclamation .

Reeve and Bower (1960) tried to avoid the drop in permeability of sodic soil by leaching it with a mixture of irrigation water and sea water, i.e., the high-salt water dilution method . In addition to its effect in maintaining a suitable level of hydraulic conductivity -the high- salt water also served as a source of divalent cations required for exchangeable  $\text{Na}^+$  replacement . The solubility of native gypsum and calcium carbonate was enhanced by the presence of  $\text{NaCl}$  in water .

Russell (1961) stated that flocculation of soil particles by the addition of salt solution and deflocculation by some exchangeable cations affect swelling and permeability of soils .

Dixit and Lal (1972) pointed out that increasing exchangeable sodium decreased soil hydraulic conductivity (K). The same effect was reported by Varallay (1974)