

**IMPACT OF USE OF TREATED WASTEWATER ON
SOME ECO-AGRICULTURAL CHARACTERISTICS
IN BAHR EL–BAKAR AREA**

BY

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B. Sc. Agric. Sc. (Soil Science), Ain Shams University, ٢٠٠٠

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أثر إستخدام ميا الصرف المعالجة على بعض خصائص البيئة الزراعية في

رسالة مقدمة من

صديقة عبد الواحد أحمد

بكالوريوس في علوم زراعية (أراضي), جامعة عين شمس, ٢٠٠٠

للحصول على

درجة الماجستير في العلوم الزراعية
()

كلية الزراعة - ه عين شمس

صفحة الموافقة على الرسالة

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ABSTRACT

Sadeaka Abd El-Wahed Ahmed. Impact of use of treated wastewater on some eco-agricultural characteristics in Bahr El-Bakar area. Unpublished Master of Science Dissertation, University of Ain Shams, Faculty of Agriculture, Department of Soil Science, ٢٠٠٧.

The aim of this study was to assess and evaluate water quality of Bahr El-Bakar drain and Nile water from Bahr Muis canal as a control which are reused for irrigation of some soils of Bahr El-Bakar area in Sharkia Governorate and their effect on soil characteristics and growing crops. Moreover, studies to improve some soil characteristics through equilibration pot experiment by applying certain usual amendments i.e., gypsum and compost as well as unusual ones i.e., byproduct-١ and byproduct-٢ (waste products from Citric Company) to the tested soil. A field experiment was conducted to study the effect of above treatments i.e., byproduct-١ and (١/٢ byproduct-١ + ١/٢ byproduct-٢) on some soil characteristics as well as yield and elemental composition of wheat plants.

The results show that water of Bahr El-Bakar drain could be classified as (causes severe problem), $EC_w > ٢ \text{ dS.m}^{-١}$ and no alkalinity hazard, $SAR < ١٠$, while waters of Bahr Muis canal was classified as (causes no salinity problem and no alkalinity hazard). The Cu, Co and Ni concentration exceeded the permissible limits in Bahr El-Bakar drain. While, Fe, Mn, Zn and Pb concentrations in all waters were below the permissible limits.

Soil irrigated with wastewater contained relatively lower organic matter and total calcium carbonate contents compared with soil irrigated with fresh water. A little differences were found between the tow soil samples in the clay content and soil moisture constants. Whereas, the higher values of hydraulic conductivity were in the soil irrigated with fresh water compared with that irrigated with wastewater. The pH values of the two soils were below ٨,٥ with slight increase for soil irrigated with wastewater over that irrigated with fresh water. The EC_e values of soil irrigated with wastewater was ٧.٦٦ and ٥.٥٨ fold that of soil irrigated with the fresh water in the surface

and subsurface layers, respectively. The values of SAR increased in surface and subsurface layers by 30.0 and 16.2 fold in the soil irrigated with wastewater compared to that of soil irrigated with fresh water, respectively. The ESP values of soil irrigated with wastewater were 2.24 and 2.00 fold that of soil irrigated with fresh water in the surface and subsurface layers, respectively. The soil irrigated with wastewater contained Cu and Ni within the permissible limits. Irrigation of wastewater significantly decreased macronutrients compared to irrigation with fresh water in cotton and wheat plants prior to flowering. The highest values of heavy metals content were found in plants grown on soil irrigated with wastewater. Although, the levels of different heavy metals were generally within the normal range.

The physical properties including bulk density and soil moisture constant as well as the chemical properties including pH, EC_e, SAR and ESP were improved by application of each amendments. Byproduct-1 as well as (1/2 byproduct-1 combined with 1/2 byproduct-2) proved to be effective more than other amendments. The (1/2 byproduct-1 combined with 1/2 byproduct-2) proved to be significantly more effective than byproduct-1 treatment.

The grain yield of wheat was increased due to byproduct-1 or (1/2 byproduct-1 combined with 1/2 byproduct-2) addition to the soil compared with the control. The higher effect is obtained with (1/2 byproduct-1 + 1/2 byproduct-2) treatment. Concentration of macro and micronutrients in leaves and grains of wheat plants increased due to treating soil with the two byproducts, byproduct-1 or (1/2 byproduct-1 combined with 1/2 byproduct-2). Most of those increases were significant, particularly in case of (1/2 byproduct-1 combined with 1/2 byproduct-2) treatment.

Key words: Wastewater - Soil physical characteristics - Soil chemical characteristics - Improvement - Salt affected soil - Industrial byproducts - Nutrients availability - Wheat plants.

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