TREATED WASTEWATER IMPACT ON PRESSURIZED IRRIGATION SYSTEMS PERFORMANCE

By

SALWA HASSAN ABDOU MOHAMMED

B. Sc. Agric. Sc. (Agric. Mechanization), Ain Shams University, 2004
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ABSTRACT

Salwa Hassan Abdou Mohammed: Treated Wastewater Impact on Pressurized Irrigation Systems Performance. Unpublished Ph.D. Thesis, Department of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, 2017.

The aim of these study is to investigate the effect of using treated wastewater on pressurized irrigation system, soil and cultivated plant. All field experiments were carried out in the experimental farms at Al-Gabal Al-Asfar, El-Al-Khankah, Al-Qalyubia Governorateat at 30˚12 07.9 N, 31˚24 39.7 E. (20 x 45) m^2 plot area was selected for carrying out the experiments. The main plot was divided to two sub plots (20 x 25) m^2 for drip irrigation system, (20 x 20) m^2 for mini sprinkler irrigation system.

Results indicated that the use of drip irrigation system was the best, when the emission uniformity was (80.81 – 68.75 – 83.17 – 89.39) % for emitters (2l/h self, 2l/h non self, 8l/h self and 8l/h non self) respectively. Accumulative clogging ratio was range of (2.87 – 16.64), (3.21 – 37.98), (5.04 – 11.3) and (1.3 – 19.2) % respectively. Percentage of roughness at main lines by using treated wastewater was higher than fresh water, which was (24.37) %, and sediments by using fresh water was higher than treated wastewater, which was (47.31) %. At sub main lines roughness by using treated wastewater was higher than fresh water, which was (10, 43.75) % for drip and sprinkler systems respectively, and sediments by using fresh water was higher than treated wastewater, which was (48.78, 6.25) % for drip and sprinkler systems respectively. At manifold lines roughness by using treated wastewater was higher than fresh water, which was (55.6, 98.8) % for drip and sprinkler systems respectively, and sediments by using fresh water was higher than treated wastewater, which was (60, 1.18) %.

Keywords: Well water – Treated wastewater – Performance - heavy elements – jojoba – pressurized irrigation – Surface roughness.

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INTRODUCTION

Water is considered the backbone of life and development for all humans on this globe as well as for all other kinds of animals and plants. The problems of increasing water shortages and scarcity, and the continuous drought phenomena currently faced in many arid and semi-arid regions, increase the magnitude of the problem. Therefore, other ways proposed or already used for developing new water sources such as seawater desalinization, brackish water, and the use of treated wastewater from wastewater treatment facilities (**MWI 1998a; 1998b**).

Treated domestic sewage is being reused for irrigation with or without mixing with fresh water. The increasing demands for domestic water will increase the total amount of sewage available for reuse. It is estimated that the total quantity of reused water is estimated to be 13 BCM in 2013. Reuse of non-conventional water sources such as agricultural drainage water and treated sewage water cannot be added to Egypt's fresh water resources. In fact, using these sources is a recycling process of the previously used Nile fresh water in such a way that improves the overall efficiency of the water distribution system. The amount of water that returns to drains from irrigated lands is relatively high (about 25 to 30%). The reuse practices increase the overall efficiency of the system as comparable to the efficiency of modern irrigation systems. **(Ministry of Water Resources and Irrigation, 2014).**

The use of low-quality water agriculture requires salts laundering and drain excess water. However, there are some micro salts and chemicals that reduce the quality of wastewater in irrigation systems. The quality of the water is a source of pollution of water bodies located downstream of the sewage outlet. Also, the deep cold lead to groundwater contamination. Therefore, it requires irrigation with salt water a comprehensive analysis to ascertain the validity of the use of water. Taking into account the groundwater and surface water resources flowing downstream in the river bed. Thus, the continuous and permanent use of

salt water in irrigation requires control of the salinity of the soil, and a decrease in the amount of wastewater, and disposal of the return of irrigation water to reduce the side effects on the quality of water resources relics **(Julian Martinez, 1999).**

According to United Nation's Common Country Assessment (**UN CCA,2001**) the present and predicted water resources by BCM in 2001, 2017 resp. are 4.5, 8.4 from agricultural drainage water, 0.7, 2.5 from treated domestic waste water and 6.7, 6.7 from treated industrial waste water.

The aim of this study:

1- Reuse of treated wastewater at different concentrations of elements.

2- Study the effect of water treatment on the network distributers (sprinklers – drippers) such as (pressure - discharge – radius of wetting - tracks radius – clogging ratios – wetting pattern front for different treatments for irrigation systems ..... etc.).

3- Study on the environmental impacts associated with the soil and plants by using treated wastewater.