

**HYDRAULIC STUDY ON MEDIA FILTERS USING  
LOW-QUALITY WATER FOR COTTON  
IRRIGATION**

**BY**

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B.Sc. Agricultural Engineering, Fac. Agric., Ain Shams University, 2013

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## ABSTRACT

**Heba Mohamed Fareed Mohamed El-waly: Hydraulic Study On Media Filters Using Low-Quality Water For Cotton Irrigation. Unpublished M. Sc.Thesis, Department of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, 2020.**

The aim of this study is to investigate the effect of media depth on the performance of different types of emitters on pressurized irrigation system using treated wastewater. Also this study estimates the effect of using treated wastewater on the cotton (verity Giza 94) growth, quantity and quality. All field experiments were carried out at Sarapium Forest, Ministry of Agriculture and Land Reclamation in “Sarapium”, Ismailia Governorate, at 30°51'43 N, 32°32' 70 E. (15 x 60) m<sup>2</sup> plot area was selected for carrying out the experiments. The first experiment for filtration performance designed as a split-plot with three replications. Two media depths (50 cm and 70 cm) were selected for the main plots while the different operation times (0, 25, 50, 75 and 100h) were selected for sub-plots with three replications. The second experiment to irrigate cotton using treated wastewater. The main plots involved two plant distributions (Mutual and Opposite) and the sub-plots involved the three types of emitters namely: online 4 l/h compensative, online 4 l/h non-compensative and built-in 4 l/h-30cm non-compensative.

Results indicated that:

Increasing media filtration depth from 50 to 70 cm has led to decrease the filtration flowrate with increasing pressure losses, biological oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS). The filtration flowrate decreased by increasing operation time from 0 to 100 but pressure losses, BOD<sub>5</sub> and TSS was increased.

Emitters performance of online compensative and built-in non-compensative were generally better than the online non-compensative

under using treated wastewater and emitters performance decrease by increasing operation time from zero to 100 hours.

Plants distribution significantly effect on growth and yield components of cotton. Planting cotton by mutual method gave the highest values of number of opened bolls per plant, seed cotton yield (Ken. per fed.).

Using on-line compensative emitter gave the largest values of plant height, number of opened bolls per plant, boll weight and seed cotton yield (Ken./fed.).

Mutual planting method and online compensative gave the highest values of number of fruiting branches per plant, boll weight, number of opened bolls per plant, seed index and seed cotton (yield per fed.).

**Keywords:** Media filter, Treated wastewater, Water quality, Drip irrigation, Emitter types, Cotton Growth and Yield.

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## INTRODUCTION

Due to the limited available water resources, it is essential to increase water-use efficiency; recycling and reusing available water resources to develop unconventional water resources. Hence, scarcity of water resources has dictated the need to use different types of low quality water and increase the horizontal land expansions. Irrigated agriculture is the biggest consumer of water in Egypt since agricultural irrigation consumes 85% of fresh water, where it is more difficult to meet the agricultural water demand with conventional resources.

The actual resources currently available for use in Egypt are 55.5 BCM/yr, and 1.3 BCM/yr effective rainfall on the northern strip of the Delta, non-renewable groundwater for western desert and Sinai, while water requirements for different sectors are in the order of 79.5 BCM/yr. The gap between the needs and availability of water is about 20 BCM/yr. This gap is overcome by recycling. The overall efficiency of the Nile system in Egypt is about 75%.

In Egypt, acute shortage of water necessitates the development of new water sources. The supplies of sewage water effluent progressively increased with increasing population. Currently, Egypt produces 5.5 – 6.5 B.C.M. of sewage water per year, of that amount, about 2.987 B.C.M. per year is treated, but only 0.7 B.C.M. per year is utilized for agriculture, mainly in direct reuse in desert areas or indirect reuse through mixing with agricultural drainage water.

The use of treated wastewater should be considered an integral component in country's national water strategic plan. However, the constraint facing use of treated wastewater are; health, impacts and