Introduction

Water is the essential habitation for fish and other aquatic organisms. The reproduction, growth, and developing of the fish are carry out in water, therefore, there should be a better water quality to ensure the fish to grow and develop, it is very important for fish.

Although improvement of canal and field irrigation systems will result in some overall water savings will be forced, in future to utilize the increased amounts of low quality water. The emphasis of increased reuse of drainage water for irrigation is essential in Egypt, expands its agricultural base to meet food requirements of a rapidly rising population. In most of the downstream parts of the Nile and horizontal expansion areas, there is a potential to increase greatly the reuse of drainage water for irrigation. Agricultural drainage water in Upper Egypt is discharged back into the River Nile, while the drainage water in the Nile Delta is collected through an intensive drainage network and disposed to the Sea. About 12 billions m of drainage water are discharged to the Sea each year, and only about 5.0 billions m are currently being reused.

The population increase requires an addition of new agricultural lands. Therefore, there has always been an urgent need to increase the water amount and/or an optimum usage of current irrigation water. The main resource of water is the Nile River that supplies Egypt with a limited amount of water. So, alternative sources, i.e. groundwater and reuse of agricultural drainage as well as sewage waters are used for irrigation in many parts of Egypt **(El-Ameen *et al.*, 2005).**

Egypt, as a semi-arid country, is facing great challenges in managing its water resources to meet the progressive demand of irrigation water for food

production. The River Nile is the life artery of Egypt as it is considered the main source of water for Egypt which supplies the country with an annual amount of 55.5 BCM of water, from which 85% is used for irrigation. Other sources of irrigation water also include about 1.5 BCM of groundwater. Besides, the re-use of agricultural drainage water contributes by an amount of about 7 BCM of water **(Nour El Din, 2007).**

In Egypt, drainage water is actually a combination of agricultural drainage water, industrial effluents, and sewage water with different ratios. Agricultural land drainage is and will continue to be a vital and necessary component of agricultural production systems. Due to scarcity of water resources, drainage water is being reused **(Tawfik, 2003).**

Currently about 5.5 BCM of drainage water are being reused after mixing with fresh water. This amount is expected to increase up to 9.6 BCM by the year 2017**.** Another form of reuse is being carried out where drainage water is reused without mixing with irrigation water. A major concern when considering drainage water reuse is whether the drainage water quality is within the allowable limits for different uses as outlined by the national and international water quality standards and guidelines **(Tawfik, 2003).**

Drainage water is one of the waste wealth's that could be treated if necessary and re-used to serve in the aquacultural and agricultural development. The records show that the drainage water in Egypt represents 46-54% of total annual irrigation water which could be estimated as 10-12 milliards m^3 drainage water. This volume is equal or more than double of our benefits from the high dam. Therefore, it is not wise to leave this abundant amount of water flowing initialized to the sea, after spending hundreds of millions of dollars to have it. Making use of these quantities of drainage water it will put an end to the problem of direct competition between

agriculture and aquaculture for fresh water. As for agricultural purpose, some of the drainage water could be used successfully as it contains several fertilizers that could be utilized by plant. However, it should be taken into consideration that the values of chemical measurement are in the allowable limits of plant growth **(Dawah & Nagdy 2000 and Abd El-Fattah, 1992).**

Agricultural drainage water is also lifted from drains and mixed officially with fresh water in some canals to supplement irrigation water requirements at peak demand times. According to the National Water Resources Plan, this amount is estimated as 7 BCM with an average lift of about 4-5 meters. In addition to that, there is a considerable amount of non-official drainage water re-use is pumped by individual farmers to irrigate their fields during water shortage in summer **(Nour El Din, 2007).**

Land application of either effluents or sludges might introduce both deleterious chemicals, including heavy metals and persistent organic chemicals and pathogenic micro-organisms into soil systems **(Sagik *et al.*, 1979)**.

The total annual discharge of drainage water in Egypt is more than 14 billion cubic meters; most of this water is disposed of in the open sea **(Seyam, 1989).** There are many trails in Egypt for using the drainage water; alone; or mixed with Nile fresh water, especially in regions that have drainage water of good or moderate quality. In Sharkia Governorate, reusing of drainage water from Al-Areeni agricultural drainage drain and sewage drain branched to cover the shortage of fresh water for legal and illegal rice fields in Sharkia.

Where Al-Areeni drain cover large area from Sharkia Governorate, it starts from Beni-Amir village and passes through Kafr Hamoda, Kafr Hamad Mousa, Kafr Isa Agha, Sufiya, and finally end at San El-Hagar.

The objective of this study was to evaluate Iron, Zinc, Copper, Cadmium and Lead contents in water and *Oreochromis niloticus* collected directly from the canals.

Therefore the present work aimed to achieve the following goals:

- Different physical and chemical parameters of water during different seasons.
- Water residues of some selected heavy metals (Fe, Zn, Cu, Cd, and Pb).
- Residues of the investigated heavy metals (Fe, Zn, Cu, Cd, and Pb) in gills, liver, and muscle samples of Nile tilapia fish *(Oreochromis niloticus)* as a common popular fish for human consumption.
- Changes involved in abundance, and distribution of different divisions of phyto and zoo plankton as well as their total count during different seasons.