



Fayoum University
Faculty of Science
Zoology Department

Environmental impact assessment of drainage water treatment on fish at Fayoum governorate

By

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ABSTRACT

Due to freshwater scarcity, the use of drainage water for aquaculture is a severe challenge in Egypt (one of the largest cultured tilapia producers worldwide). The study aims to assess the impact of drainage water treatment on growth and meat quality of Nile tilapia (*Oreochromis niloticus*) reared in five different ponds irrigated with different drainage water resources in El-Fayoum Governorate. Physicochemical parameters, metals (Cu, Pb and Cd), hematological parameters, growth parameters, meat quality and genotoxicity analysis using comet assay, in the water of fishponds and their sources, were measured. The highest values of pH, total hardness, total alkalinity, salinity, and total ammonia were recorded in the Dayer El-Berka fish farm, indicating the detrimental impact of untreated drainage water on the water quality in aquaculture. While the nitrate, nitrite, and phosphate levels were extremely high in the El-Bats fish farm (concrete pond) compared to other farms. Copper concentrations were below detection limits in all farms except Dayer El-Berka, and the El-Bats fish farm (earthen pond) had high lead content, while Wadi Al-Raian fish farm had higher cadmium concentrations. The lowest heavy metal values were recorded in the El-Bats fish farm (concrete pond) irrigated with the treated drainage water of El-Bats drain. Dayer El-Berka fish farm having the lowest count of red blood cells (RBCs), hemoglobin (Hb), and hematocrit Ht. Productivity parameters showed that Nile tilapia reared in Wadi Al-Raian and Al-Wadi fish farms had the highest growth performance, while Dayer El-Berka had the lowest growth performance. DNA fragmentation was also found to increase statistically in tilapia collected from Dayer El-Berka and Wadi Al-Raian fish farms, indicating that continuous exposure to genotoxic metals could impair the expression of proofreading enzymes and repair mechanisms. The study concludes that fish cultured in farms irrigated with high quality water resources exhibit excellent growth performance, superior meat quality, and safe flesh for human consumption.

Key words: Environmental impact, drainage water treatment, Fish culture.