INTRODUCTION

Aquaculture is one of the fastest growing food-producing sectors in the world. It is developing, expanding and intensifying in almost all regions of the world. The global population is increasing, thus the demand for aquatic food products is also increasing. So, aquaculture is considered to be an opportunity to bridge the supply and demand gab of aquatic food in most regions of the world.

Fish farming is one of the main protein sources that can be relied on for the protection of food security, in particular, to ensure animal protein value-high food. Unfortunately, there are a lot of problems facing fish farming especially water pollution. With the advent of agricultural and industrial revolution, most of the water sources are becoming contaminated **(Khare and Singh, 2002),** via industrial discharges containing toxic and hazardous substances, including heavy metals **(Gbem *et al.*, 2001; Woodling *et al.*, 2001).** Heavy metals are particularly severe in their action due to bio-magnification in the food chain.

Some heavy metals are essential elements, while others are non-essential. Increased discharge of both essential and non-essential metals into natural aquatic ecosystems can expose aquatic organisms to unnaturally high levels of these metals **(van Dyk *et al.*, 2007).** Zinc (Zn) is one the most important trace metal participates in the biological function of several enzymes **(Maity *et al.*, 2008)**. While severe Zn deficiency causes growth impairment and anorexia, a

marginal Zn deficiency causes depression of the immune response **(Cousins, 1996).** Nile tilapia requires 30 mg/kg Zn purified diet for maximum weight gain and suitable Zn levels in bones and blood **(Eid and Ghonim, 1994).**

Zinc in certain concentration is desirable for the growth of freshwater animals but its over accumulation is hazardous to exposed organisms as well as to those who consume them directly or indirectly through food chain. **WHO (1998)** reported that the permissible level of Zn in water is <0.11 ppm for freshwater aquaculture, and <0.086 ppm for marine aquaculture. Among aquatic organisms, fish cannot escape to avoid the detrimental effects of these pollutants, and they are generally considered to be the most relevant organisms for pollution monitoring in aquatic ecosystems **(van der Oost *et al*., 2003).**

Bioaccumulation of heavy metals in fish body reflects the amount ingested by the organism, the way in which the metals are distributed among the different tissues, and the extent to which the metal is retained in each tissue type. The pattern of metal accumulation in fish tissue can be utilized as effective indicator of environmental contamination **(Sultana and Rao, 1998).**