Chapter 16

TOXIC EFFECTS of DELTAMETHRIN UPON *Pseudorasbora parva* (Temminck&Schlegel, 1846)

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Introduction

It is known that the ever increasing use of the pesticides have genotoxic effects upon the non- target organisms (Tardriff, 1988). They reach the aquatic lands by various means and exert toxic effect on fish and other aquatic organisms. The pesticides enter the fish body through gills alongside with the dissolved oxygen and accumulates in various organs (Stainer & Fishman, 1994). The pesticides effect the fish by various means. They can have a direct effect upon the fish population having them stop spawning and breeding as well as causing direct mortality. Also the tissue damage caused by the effect of the pesticides makes the organism highly susceptible to habitat changes (Toros & Maden, 1991). After the destructive effect of the prolonged presence of organochloride, phosphorous and carbamate pesticides upon the environment was realized. Thus the pyrethroides with a shorter persistence on nature has become very popular. Deltamethrin is aα-cyanopyrethroid which has very toxic effect upon the flies. However it hardly effects the mammalians due to its fast metabolism and discharge rates. However, it was reported to be very toxic upon fish and other aquatic organisms (Stelzer & Gordon, 1984).

The risks of chemicals on organisms are determined by the acute toxicity tests. The most widely used test among them is the lethality test. These reveals the degree of the effect of the toxic compound upon the organisms and specific organs (Saygı, 2003). The acute toxicity experiments enable us to determine the sublethal concentrations and investigate the genotoxic, histological and histopathological effects of the toxic agent upon cells and tissues. The use of micronucleus test on fish has become a very popular in recent years since the fish erythrocytes are nucleated which can easily be utilized in this test (Könen & Çavaş, 2008). Micronuclei are the structures which the chromosomes convert into a chromatin state by tetramer or tri-fragmented division. These are very small structures separately located next to the nuclei (Al-Sabti, 1991). The hematocrit data of the fish are widely used as the indicators of the physical condition, stress and the disease of fish especially in fish

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et al. (2012) reported hyperemia, telangiectasis in the gills and fusion, hyperplasia, epithelial lifting in secondary lamellas of propoxurun carp. They also reported hemorrhages in livers, collapse in glomerulus and pre-nephritis and edema in kidneys. There were important histopathological changes reported in gills, livers, kidneys, spleens, gonads, muscle and skin tissues of *Cyprinus carpio* exposed to sublethal concentrationss of fenitrothion insecticide (Sepici et al., 2009). Also the agricultural chemicals are shown to cause hyperemia and fattening in liver, clogging in sinusoids, necrosis and changes in hepasoit structure of the fish (Walsh &William, 1972). Atamanalp (2000) observed that cypermethrin cause hydropic degeneration in liver hydropic degeneration in hepatocytes, fattening, hemorrage and cellular necrosis in livers, cellular dilatation in kidneys, profilation and necrosis in glomerulus of rainbow trout. It is reported that the lesions in kidneys should be evaluated with the other histopathological findings (Lawrence &Hemingway, 2003). It is also reported that the exposure of deltametrin caused hypertrophy and degeneration in livers and serious histopathological complications in sinusoids and vacuoles of *Xiphophorus helleri* from Poecilidae family (Yön et al., 2014).

This study showed that deltamethrin has a toxic effect on *P. parva* and cause histopathological complications in its tissues. The worst affected organs were gills, livers, brains and kidneys. The MN frequency of hematocrit levels and the histopathological diagnosis showed parallelism with the literature data. However, the histopathological findings were observed to change according to species and the contaminants exposed. The fact that LC_{50} value found by the acute toxicity experiment is quite high may be attributed to the invasive nature of *P. parva*, its high adaptation capacity to different environments and its capability of developing a high resistance to various agents. The data showed that deltametrin is quite toxic for the aquatic organisms.

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