



Effects of diazinon on adaptation to sea-water by the endangered Persian sturgeon, *Acipenser persicus*, fingerlings



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ABSTRACT

To replenish the depleting populations of sturgeon fishes especially Persian sturgeon, *Acipenser persicus* in the Caspian Sea, millions of Persian sturgeon fingerlings are farmed through artificial propagation and released into the Iranian river estuaries annually. Fish osmoregulation is a vital physiological process that can be affected during the release. Many Iranian river estuaries are under the influence of pesticides originating from farming activities that may affect osmoregulation. In this study, Persian sturgeon fingerlings were exposed to sublethal concentrations (0, 0.18, 0.54, 0.9 mg L⁻¹) of diazinon for 96 h (short-term trial) and 12 days (long-term trial) in fresh water (FW) and then fish were exposed in brackish water (BW) for 24 h. After 96 h and 12 days of exposure in FW, the lower levels of plasma triiodothyronine (T₃), thyroxine (T₄), Na⁺, Cl⁻, K⁺, gill Na⁺/K⁺-ATPase activity and number of chloride cells were observed in exposed fish (0.54 and 0.9 mg L⁻¹ diazinon) compared to control group and 0.18 mg L⁻¹ diazinon treatment. Also, higher levels of plasma cortisol (except 0.18 mg L⁻¹ diazinon treatment in long-term trial) were observed in diazinon exposed fish compared to control group. However, gill Na⁺/K⁺-ATPase activity and the number of chloride cells were higher in fingerlings exposed to diazinon compared than control. When fish were exposed in BW for 24 h, the following changes occurred: (a) in short-term trial: increases in cortisol and Cl⁻ levels (0.54 mg L⁻¹ diazinon), Na⁺ (0.9 mg L⁻¹ diazinon) and gill Na⁺/K⁺-ATPase activity (0.18 mg L⁻¹ diazinon). In control group, cortisol, T₄, Na⁺, gill Na⁺/K⁺-ATPase activity and the number of chloride cells increased significantly. (b) In long-term trial: increases in K⁺ levels in fish exposed to 0.9 mg L⁻¹ diazinon, Na⁺ in all diazinon concentrations and decreases in chloride cells number in fish exposed to 0.18 mg L⁻¹ diazinon. In control group, significant increases were observed in cortisol, T₃, Na⁺ and chloride cells number. Finally, gill showed many histopathological damages during exposure in FW and BW. Our results suggest that the contamination of river estuaries with diazinon may alter the osmoregulation ability of released Persian sturgeon fingerlings, which could lead to a failure in their restocking program in the Caspian Sea.

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1. Introduction

Persian sturgeon, *Acipenser persicus* is an ecologically and economically most important fish species which distributed mostly in the southern and to some extent in the northern parts of the Caspian Sea. This species is found in Azerbaijan, Kazakhstan, Russia and mainly in Iran. Age at maturity varies latitudinally and usually is ranged between 14 and 18 years for females and 12 and 16 years for males (Moghim, 2003). At sea, the Persian Sturgeon feeds on a wide variety of benthic molluscs, crustaceans and small fish (Birstein et al., 2002; Pikitich et al., 2005).

Published studies have showed that population size of all

sturgeon species including Persian sturgeon have declined in Caspian sea which this decline has been reported between 80–90% in for Persian sturgeon the last 30–40 years (Moghim et al., 2006). The over fishing, contamination of water with agricultural (especially pesticides) and industrial wastes and loss of habitat and spawning sites have been reported as main reasons of depleting populations of Persian sturgeon (Kiabi et al., 1999; Nasrollahzadeh, 2010) and other sturgeon fishes in the nature (DeMeulenaer and Raymakers, 1996; Kiabi et al., 1999; Nasrollahzadeh, 2010).

According to an annual restocking program, millions of Persian sturgeon fingerlings (2–4 g) are produced by Iranian Fisheries Organization through artificial propagation and released into some of the Iranian river estuaries flowing into the Southern Caspian Sea such as Sefidroud.

During the last decade, industrialization and optimization of agriculture in Iranian coastal regions of the Caspian Sea have been

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