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ACUTE TOXICITY OF HEAVY METALS, CADMIUM AND COPPER IN INDIAN MAJOR CARP, *CATLA CATLA* FINGERLINGS

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ABSTRACT : Industrial effluent are the major sources of heavy metal pollution and it is released into fresh waterbodies. Heavy metals cause several ill effects to aquatic ecosystem and organisms including fish. The acute toxicity of chosen metals (Cadmium and Cupper) against Indian major carp, *Catla catla* for 24, 48, 72, and 96hr were determined by probit analysis method. The LC_{50} for 24, 48, 72 and 96 hours for $CdCl_2$ and $CuSO_4$ were found as 9.585, 7.463, 6.334 and 4.823 mg/l and 16.820, 13.912, 11-146 and 8.993 mg/l, respectively. The result also revealed that mortality rate depends upon concentrations of heavy metals and duration of exposure. Among the toxicants selected, $CdCl_2$ is more toxic than $CuSO_4$ in fresh water major carp.

Key words : Probit analysis, LC_{50}, cadmium, copper, *Catla catla*.

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INTRODUCTION

Pollution of aquatic ecosystem with heavy metals has become a serious health concern in recent years. These metals are introduced into the aquatic ecosystem through various routes such as industrial effluents and wastes, agricultural runoff, domestic garbage dumps and mining activities (Srivastava and Prakash, 2018a). The introduction of many relatively toxic heavy metal cations in small amounts into an aquatic environment causes various changes in the internal dynamic of aquatic organism, even at sublethal levels (Srivastava and Prakash, 2018b). These are unique among pollutants, in that they occur naturally and in many instances are ubiquitous in the environment and these are recognized as strong biological poisons because of their persistent nature, toxicity, tendency to accumulate in organisms and undergo food chain amplification (Srivastava and Prakash, 2019a). Under certain environmental conditions like the metals can accumulate to toxic concentrations and cause ecological damage (Srivastava and Prakash, 2018c). Thus the heavy metal in the aquatic environments has been as a potential threat to the aquatic organisms including fishes. Metals are known to inhibit the several biochemical and physiological mechanism vital for fish metabolism (Srivastava and Prakash, 2019b). Among the heavy metals, cadmium, lead, mercury, copper, zinc, chromium and nickel are comparatively notorious toxicants and most of their compounds are water soluble and non-degradable (Bose *et al*, 2013). Increased discharge of these heavy metals into natural aquatic ecosystems can expose aquatic organisms to unnaturally high concentrations of metals. These excess amounts in addition to naturally occurring levels gradually build up to toxic levels causing damage to the biota of the aquatic ecosystem. Among aquatic organisms, fish cannot escape from the detrimental effects of these pollutants, and are therefore generally considered to be the most relevant organisms for pollution monitoring in aquatic ecosystems (Van der Oost *et al*, 2003).

The presence and concentration of any metals varies between fish species; depend on age, developmental stage and other physiological factors. Although many metals are essential, but all metals are toxic at higher concentrations because they cause oxidative stress by formation of free radicals or they can replace essential metals of pigments (haemoglobin or haemocyanin) or enzymes disrupting their function. A lot of works have been done about arsenic toxicity in various vertebrates including fishes (Prakash and Verma, 2019, 2020a, 2020b, 2021; Verma and Prakash, 2019).

Cadmium, one of the twenty three heavy metal toxicant, may be transported to aquatic ecosystems as a