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Toxicity and other effects of pesticides to fresh water fishes

K S Tilak

Acharya Nagarjuna University, India

Adopting static and flow-through methods of APHA, acute toxicity of diverse pesticides (both technical and commercial grades) to native select freshwater food fish was assessed at different intervals, i.e., 24h, 48h, 72h and 96h. Toxicity experiments were also conducted by mixing the pesticides of different classes in varied ratios. The results revealed species-specific toxicity of the pesticides. LC50 values were higher in static rather than flow-through tests, the latter simulating the near-natural conditions. Generally the toxicity varied with duration of exposure, and for some pesticides, 48h-LC 50 value remained unchanged even at 96h. The formulations proved more toxic than technical grades, and some resultant metabolites more toxic than their parent compounds; also, toxicity in different ratios was additive or cumulative or synergistic. Various parameters like oxygen consumption, biochemical, haematological and histopathological changes, and the qualitative confirmation by TLC, quantitative estimation by GLC, and protein profiling were studied following standard procedures. The results observed on different species varied with the toxicants. Decrease in oxygen consumption due to conversion of haemoglobin to methemoglobin, which can be thwarted by substituting required amino acid in the feed management of aquacultural practices. Qualitative confirmations provide basic information for tissue deposition, which, in turn, triggers off biochemical and histopathological changes, making it unfit for human consumption and impairment of quick growth making the fish unsuitable for aquaculture by which it can not be sustainable. A decrement in acetyl cholinesterase wherein abnormal behaviour was noticed and it has also resulted in fish deprived of natural and artificial feed. Histopathologically, the first organ succumb damage is the gill wherein the architectural design is altered leading to changes in physiological processes of respiration and excretion. In other vital organs of the fish, brain, liver and kidney are also resulted in considerable damage to do away their normal functions. The residue of pesticides are qualified by confirming with their standard "Rf" values and after only they can be estimated by GLC which revealed as the uptake of the toxicants and further changes reverberate as in cascade mechanism. A chance of eating such latent residues as repository due to palatability of human beings, bioaccumulation may be cautioned.

Biography

K S Tilak is a Doctorate from Andhra University, Waltair, AP, India and the former Dean of faculty of Natural Sciences, Chairman Board of Studies (PG) Zoology and Head of the Department of Zoology and Aquaculture. He has 40 years of research experience on 'pesticide toxicology' having guided 29 research students and published 72 research papers in international and national journals recipient of prestigious 'Archana Gold Medal' by Academy of Environmental Biology, Editor and Reviewer of reputed toxicity journals and also conducted international and national conference in Acharya Nagarjuna University, AP, India.

profkstilak@gmail.com

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