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Behavioral Changes and Gill Histopathological Alterations of Red Hybrid Tilapia (Oreochromis sp.) Exposed to Glyphosate Herbicide

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Abstract : Glyphosate [N-(phosphonomethyl) glycine] is among the most broadly and generally recognized broad-spectrum herbicides used in agriculture due to its low cost and effectiveness in weed management. The pollution of glyphosate in the aquatic environment can be via water run-off from agricultural lands or by spray drift, aerial spraying or due to industrial discharge, which may be seen as a threat to aquatic biota. Fish is one of the best organisms to study the toxicological aspects of glyphosate. A 49-day experiment was conducted under laboratory conditions to ascertain the effects of technical grade glyphosate on behavior and histopathological conditions in the gills of red hybrid tilapia using a light inverted microscope. Air gasping, erratic swimming, fin movement, mucus secretion, hemorrhages and loss of scales were observed as behavioural changes in the exposed fish. There was no histopathological complication observed in the gill of the control fish, but various levels of alterations were seen in the gills of the fish exposed to glyphosate herbicide. These include lifting of primary lamella, congestion of secondary lamella, as well as hyperplasia in both primary and secondary gill lamella and hypertrophy of secondary gill lamella. Based on the findings of this study, glyphosate herbicide exerts behavioural and histopathological changes in the gill of red hybrid tilapia, and therefore, the fish is considered a good bioindicator in aquatic environment monitoring. Excessive usage of glyphosate herbicide near aquatic habitats should be discouraged.

Keywords : behavioural, histopathological, oreochromis niloticus, glyphosate
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