Water and Fish Quality of Aquaculture Pond Adjacent to Intensive Pesticides Application Agro-system

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ABSTRACT

Water and fish quality was specified for a private aquaculture pond localized at the north of Egypt during June - November 2017. The main traditional physicochemical parameters of water were evaluated. Moreover, the occurred levels of trace elements, polycyclic aromatic hydrocarbons (PAHs) and pesticide residues in water and fish of Nile Tilapia (*Oreochromis niloticus)* and grey Mullet *(Mugil cephalus*) of the pond were specified. The levels of total hardness, ammonia as N, sulfide, nitrite and phosphate were violated the water quality guidelines for the pond fish cultures. Trace metals of arsenic, cadmium, chromium, copper, nickel, lead and zinc were detected in all the water and fish tissue samples at remarkable high levels (but still below the maximum permissible levels established by WHO. From 15 PAHs analyzed, naphthalene, acenaphthene, phenanthrene, fluorene, anthracene, fluoranthene, benzo (a) anthracene and benzo(b)fluoranthene were detected in water at range of 0.087-0.580 µg/l, while phenanthrene, fluorene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene and dibenzo(a,h)anthracene detected in fish muscles at range of 0.155-0.617 µg/g fresh wt. Residues of α- and ϒ-HCHs, endosulfan ı, endosulfan ıı, endosulfan sulfate, heptachlor, heptachlor epoxide, p,p´-DDE, chlorpyrifos, cypermethrin, cyfluthrin and fenvalerate pesticides were detected within the permissible levels in water at the average of 0.12-2.04 ng/l. The same compounds were also detected in the fish analyzed (except endosulfan sulfate, cyfluthrin and fenvalerate) at ranges of 0.87 - 5.6 ng/g fresh wt. of Tilapia and 0.95 - 8.32 ng/g fresh wt. of Mullet muscles. The potential occurrence of chlorpyrifos, cypermethrin, cyfluthrin and fenvalerate residues might be attributed mainly to its intensive current application on the vegetables and fruits around the fish pond, rather than the persistent organochlorines which still occurred as environmental contaminants from many years ago. The quantified levels of PAHs and pesticide residues in Tilapia and Mullet fish tissues analyzed were below its maximum permissible levels.

Key Words: aquaculture-fish-metals-pesticides-polycyclic aromatic hydrocarbons-water.