

## Toxicity bioassay and sub-lethal effects of diazinon on blood profile and histology of liver, gills and kidney of catfish, *Clarias gariepinus*

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(With 7 figures)

### Abstract

The catfish, *Clarias gariepinus*, was exposed to different acute concentrations (5-10 mg/l) of diazinon and the  $Lc_{50}$  value was recorded as high as 7.3 mg/l for 96 hours. The fishes exposed to three sub-lethal levels of diazinon (0.73, 1.095 and 1.46 mg/l) for 30 days showed that the pesticide induces changes in different blood parameters. Number of red blood cells (RBC), haemoglobin level and haematocrit values were elevated whereas white blood cells (WBC) count was reduced. Various blood indices like mean corpuscular volume (MCV), mean corpuscular haemoglobine (MCH) and mean corpuscular haemoglobine concentration (MCHC) vary insignificantly in the fish treated with diazinon. Glucose level and activity level of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) was increased in *Clarias gariepinus* exposed to diazinon. Protein level in plasma of fish treated with pesticide was changed but the change was insignificant. Histological changes in the liver, gills and kidney of fishes exposed to diazinon were apparent when compared to control. Hepatocytes necrosis and bleeding were more distinct in the fishes exposed to pesticide. Glomerulus hypertrophy and bleeding in kidneys; and fusion and degeneration of secondary lamellae and epithelial hyperplasia in gills were also observed in the exposed fish.

**Keywords:** acute toxicity, histological changes, blood profile, diazinon, *Clarias gariepinus*.

## Toxicidade bioensaio e efeitos sub-letais do diazinon no perfil sanguíneo e histologia do fígado, brânquias e rim de peixe-gato, *clarias gariepinus*

### Resumo

O peixe-gato, *Clarias gariepinus*, foi exposto a diferentes concentrações agudas (5-10 mg / l) de diazinon e o valor de  $Lc_{50}$  foi registrado tão alto quanto 7,3 mg / l por 96 horas. Os peixes expostos a três níveis sub-letais de diazinon (0,73, 1,095 e 1,46 mg / l) por 30 dias mostraram que o pesticida induz mudanças nos diferentes parâmetros sanguíneos. O número de glóbulos vermelhos, o nível de hemoglobina e os valores do hematócrito foram elevados, enquanto a contagem de leucócitos foi reduzida. Vários índices sanguíneos, como volume corpuscular médio (VCM), hemoglobina corpuscular média (HCM) e concentração de hemoglobina corpuscular média (CHCM) variam insignificamente nos peixes tratados com diazinon. Nível de glicose e nível de atividade de AST e ALT foi aumentado em *Clarias gariepinus* expostos a diazinon. O nível de proteína no plasma de peixes tratados com pesticidas foi alterado, mas a mudança foi insignificante. Alterações histológicas no fígado, brânquias e rins de peixes expostos ao diazinon foram aparentes quando comparados ao controle. A necrose e o sangramento de hepatócitos foram mais distintos nos peixes expostos ao agrotóxico. Hipertrofia do glomérulo e sangramento nos rins; e fusão e degeneração de lamelas secundárias e hiperplasia epitelial em brânquias também foram observadas nos peixes expostos.

**Palavras-chave:** toxicidade aguda, alterações histológicas, perfil sanguíneo, diazinon, *clarias gariepinus*.

### 1. Introduction

The toxic discharge from industries, different mining, and agricultural developments and processing find their way to the aquatic environment and may have detrimental effects on the inhabitants (Beijer K and Jornelo, 1979; Hamilton and Mehrle, 1986). Pesticides are one of the dangerous pollutants which cause great harm to the animals present in the aquatic environment including fishes. Diazinon with the

chemical formula (0,0-diethyl 0-[6-methyl-2(1-methylethyl)-4-pyrimidinyl] is an organophosphate insecticide and is extensively used in agriculture and domestic pest control. This pesticide is also used to control a variety of insects including: aphids, beetles, scales and pill bugs, primarily in household environment and in agriculture crops (Cong et al., 2009). Similar to other insecticides, the toxic effects of