Combined Genotoxic Effects of Pretilachlor and Pyribenzoxim on the Genome of Mice

D.D. Kozhakhmetova
Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

A.A. Askhar
Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

D.D. Begimbay
Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

A.M. Tlenshiyeva
Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

D.T. Chekimbayeva
Faculty of Biology and Biotechnology, Al-Farabi Kazakh National University, Almaty, Kazakhstan

Abstract

The intensive application of pesticides in rice agroecosystems necessitates a comprehensive assessment of their potential impact on living organisms and genetic stability. The present study evaluated the genotoxic effects of the herbicide Solito, containing Pretilachlor and Pyribenzoxim, widely used in the Akdala rice-growing region of Almaty oblast, Kazakhstan, on BALB/c laboratory mice. DNA damage was assessed in liver and spleen cells using the alkaline comet assay based on the percentage of DNA in the comet tail (%TDNA). Exposure to the pesticide resulted in a significant increase in DNA fragmentation compared with the negative control. The %TDNA values reached 9.37 ± 0.41% in spleen cells and 14.90 ± 0.92% in liver cells, indicating pronounced genotoxic activity. Cytogenetic analysis of bone marrow cells revealed a significant elevation in chromosomal abnormalities in the treated group. The frequency of aberrant cells reached 11.69 ± 0.64%, accompanied by increased numbers of chromosome- and chromatid-type aberrations, as well as point fragments. The obtained results demonstrate the potential genotoxic hazard of Solito and highlight the necessity for ecotoxicological monitoring of pesticides used in Kazakhstan's rice agroecosystems.

Keywords

Ecotoxicology, pretilachlor, pyribenzoxim, genotoxicity.