

Study of the Genotoxic Potential of Plant Growth Regulator Ethephon

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Abstract : Ethephon is one of the most widely used plant growth regulator in agriculture that its application has been increased in recent years. The toxicity of organophosphate compounds is mostly attributed to their potent inhibition of acetylcholinesterase and their involvement in neurodegenerative disease. Although there are few reports on butyrylcholinesterase inhibitory role of ethephon, still there is no evidence on neurotoxicity and genotoxicity of this compound. The aim of the current study is to assess the potential genotoxic effect of ethephon using two genotoxic endpoints; γ H2AX expression and comet assay on embryonic murine fibroblast. γ H2AX serves as an early and sensitive biomarker for evaluating the genotoxic effects of chemicals. Oxidative stress biomarkers, including intracellular reactive oxygen species, lipid peroxidation and antioxidant capacity were also examined. The results showed a significant increase in cell proliferation 24h post-treatment with 10, 40, 160 μ g/ml ethephon. The γ H2AX expression and γ H2AX foci count per cell were increased at low concentration of ethephon that was concomitant with increased DNA damage break at 40 and 160 μ g/ml as illustrated by increased comet tail moment. A significant increase in lipid peroxidation and ROS formation were observed at 160 μ g/ml and higher doses. The results showed that low-dose of ethephon promoted cell proliferation while induce DNA damage, raising the possibility of ethephon mutagenicity. Ethephon-induced genotoxic effect of low dose might not related to oxidative damage. However, ethephon was found to increase oxidative stress at higher doses, lead to cellular cytotoxicity. Taken together, all data indicated that ethylene, deserves more attention as a plant regulator with potential genotoxicity for which appropriate control is needed to reduce its usage.

Keywords : ethephon, DNA damage, γ H2AX, oxidative stress

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