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Cytotoxic evaluation of glyphosate, using *Allium cepa* L. as bioindicator

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Highlights

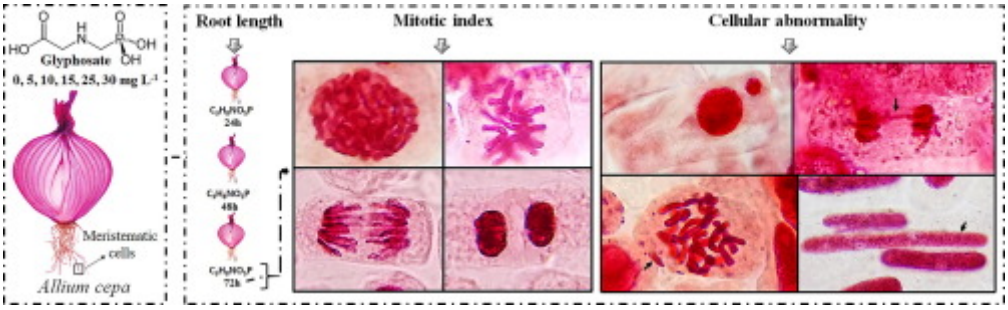
- The use of glyphosate caused permanent DNA damage.
- The 30 mg L^{-1} treatment caused an average frequency of 170 elongated nuclei.
- The exposition to 15 and 30 mg L^{-1} glyphosate caused an average frequency of 58 micronuclei.

Abstract

Glyphosate is a chemical compound used mainly as a broad spectrum herbicide, it is recognized for its proven effectiveness and easy handling. It represents more than 60% of the world market of non-selective herbicides and is used in both agricultural fields and family

gardens. The present study was designed to test the cytogenotoxic potential of glyphosate using the *Allium cepa* test as toxicity bioindicator. Consequently, bulbs of *A. cepa* were exposed to different concentrations of glyphosate (5, 10, 15, 25 and 30 mgL^{-1}) and a control (deionized water), for 72 h; root development was also studied in this period of time. The cytogenotoxic potential of glyphosate was determined by calculating the mitotic index (MI), cellular anomalies (CA) and registering the roots longitudinal growth at 24, 48 and 72 h. Regarding root development, a greater growth was observed in the control treatment in the three measurement times. The mitotic phases analysis, determined that the higher the concentration, the lower the mitotic index, in addition the inhibition of the telophase Mitotic Index (TMI) was observed in any of the concentrations. The results indicate that the exposure to glyphosate of *A. cepa* meristematic cells induces diverse types of chromosomal anomalies, such as micronuclei (MN), chromosome breaking (CB), nuclear notch (Nn), among others. Therefore, in demonstrates that glyphosate has a highly cytogenotoxic effect for any of the concentrations used.

Graphical abstract



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Keywords

Cellular anomalies; Mitosis; Chromosome; *Allium cepa*; Cytogenotoxic; DNA

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