International Journal of Ecosystems and Ecology Science (IJEES)
https://doi.org/10.31407/ijees

Abstract
Volume 9, issue 3, 2019
https://doi.org/10.31407/ijees93

Vol. 9 (3): 409-416 (2019)

EVALUATION OF TOXIC AND GENOTOXIC EFFECTS OF ROUNDUP AFTER DIRECT AND INDIRECT TREATMENT

Svetla Gateva[1], Alexander Stankov[1], Tsveta Angelova[1], Nadezhda Todorova[1], Miroslav Rangelov[2], Boika Zlateva[3], Gabriele Jovtchev[1]

[1]Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia 1113, Bulgaria;
[2]Institute of Organic Chemistry with Center for Phytochemistry, Acad. G. Bontchev str. Bl. 9, 1113 Sofia, Bulgaria;
[3]Sofia University, Faculty of Chemistry and Pharmacy, Sofia, Bulgaria;

*Corresponding Author Svetla Gateva, e-mail: spetkova2002@yahoo.co.uk;

*Received March 2019; Accepted April 2019; Published July 2019;

DOI: https://doi.org/10.31407/ijees9301

ABSTRACT

Roundup (glyphosate) is one of the most widely used systemic, non-selective herbicide in the world. Numerous studies exist about its genotoxic effect both in "*in vivo"* and in "*in vitro"* using various concentrations and endpoints. Based on the contradictory results we decided to investigate the toxic effect of roundup in concentrations, used in agriculture after direct treatment on *Hordeum vulgare* and in human lymphocytes as well as indirect applying S10 fraction from barley seedlings affected by the herbicide. ICP analysis of soil (granulometry and pH also) was performed in order to confirm the lack of harmful substances for plants and for demonstration of equal initial chemical condition of both treated and untreated fields, so manifested effects on test-system could be a result from roundup treatment. Morphometric method was used in barley grown from M1 seedlings treated with the herbicide. Cytogenetic methods were used to test cytotoxic/genotoxic effect of roundup on lymphocytes, where the cells were directly treated with the herbicide and indirectly, using S10 of barley pretreated with roundup. Morphometric data showed high inhibitory effect in barley leaves and roots after roundup application. The herbicide also induced high cytotoxic/ genotoxic activities after direct treatment of lymphocytes. S10 fraction of barley grown from seedlings affected with the herbicide induced yield of injuries that are close to that detected after direct treatment with roundup, but with lower concentration (0.9 µg/ml). Clearly harmful effect of roundup not only after direct but also after indirect treatment was observed, and its use need to be rethought.

Keywords: Roundup, cytotoxic and genotoxic activities, *H. vulgare*, human lymphocytes *in vitro*