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CYTOTOXIC EFFECT OF NANOCOMPOSITES BASED ON VANADIUM OXIDES

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Nanomaterials are widely used in various fields: medical, commercial and industrial production practices [1]. Despite the rapid progress and early acceptance of nanotechnologies, their potential for various adverse effects on humans, non-human biota and ecosystems is still not well elucidated. In this context, in recent years, there has been a rapid increase in experimental studies on the toxicity and biological hazards of nanomaterials in the environment [2].

In this paper we aimed to study the cytotoxic effects of nanocomposites based on vanadium oxides on onion meristematic cells. In the experiment were used the pyroceramic plates coated with thin layers of VO_2, V_2O_3 and V_2O_5, of nanometric dimensions [3]. Onion was selected as the model specimen for cytotoxicity assessment, which was exposed to nanocomposites for different time (48h and 72h), prior to germination. For cytological studies, root with a length of 1-2 cm were taken. Washing, fixation, hydrolysis, staining and preparation were performed according to the standard methodology of staining and observation of chromosomes [4].

According to the results of the cytological study, the exposure of the seeds to the action of nanocomposites based on vanadium oxides, induces changes in the values of mitotic index, comparative control. At the same time, fluctuations in the values of the phase indices of mitosis were recorded. Disruption of cell division phases indicates that vanadium oxide-based nanocomposites alter mitotic activity by cytoskeleton disorder and interfere with mitotic spindle formation, as confirmed by the occurrence of abnormal mitoses: C-mitoses, disturbed metafhase, ana-telofhase spindle disorders, sticky chromosomes with bridge, vagrant chromosomes and fragments. Cells with 1-2 micronuclei and binucleated cells have also been identified, which are an indicator of the above-mentioned mutations [5].

Our results demonstrated that exposure of onion to nanocomposites based on vanadium oxides causes cytotoxicity and genotoxicity.

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