

Health Hazards of Polluted River Yamuna Water: Correlations Drawn from a Plant-based Study

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Abstract—It is a well-known fact that domestic and industrial waste generated from human and industrial activities are the primary sources of toxicity in aquatic environments. Such waste contain diverse chemicals compounds which are genotoxic and carcinogenic in nature at low levels of exposure. The present study is a plant-based investigation which established the hazardous effects of polluted Yamuna water. For this, we have collected water samples from seven different locations of river Yamuna in Delhi region and analysed for different water quality parameters like pH, salinity, electrical conductivity (EC), turbidity, dissolved oxygen (DO) and total dissolved solid (TDS). The same water samples along with tap water (as control) were used for growing onion bulbs (*Allium cepa*) to examine the cytotoxic and genotoxic effect of polluted water. It was recorded that at site-1, water was slightly alkaline whereas the TDS, EC and turbidity were higher at site-5. The root tip morphology, length and number of roots per bulb also varied drastically. Further, root tip squash preparations confirmed the abnormalities at cellular, nuclear and chromosomal level. Different shapes and sizes of the cells were observed at different sites. At nuclear level, binucleate cells, lobulated nuclei, polynuclear conditions and micronuclei were recorded at site-3, 4 and 7. The chromosomal abnormalities in the form of chromosomal bridges, chromosomal loss and abnormal orientation at different sites were observed. The available literature clearly states that by damaging the DNA of organisms, the genotoxins can initiate a cascade of impairments from molecular to community levels. DNA and cytogenetic alterations in aquatic organisms have been associated with an impaired enzyme function or general metabolism, cytotoxicity, immunotoxicity, abnormal development. The report of the present investigation is a cause of major concern as this polluted water is used for irrigation by local farmers of Delhi for growing fruits and vegetables. These vegetables along with fishes are directly consumed by people of Delhi. The images of abnormal cells and nuclei can be used for mass awareness campaign to (i) educate farmers and people about the harmful effects of water pollution and further (ii) convince the Delhites not to pollute the Delhi's only lifeline, the River Yamuna.