

## Chromium toxicity in the Yamuna River ecosystem at Brij Region – Uttar Pradesh, India

Jyoti Sharma<sup>a</sup>, Gaurav Pant<sup>b,\*</sup>, Kaizar Hossain<sup>c</sup>, Akil Ahmad<sup>d,\*</sup>, Md. Afroz Bakht<sup>d</sup>, Alka<sup>e</sup>, Rashmi Tripathi<sup>a</sup>, Siti Hamidah Mohd Setapar<sup>f</sup>

<sup>a</sup>Department of Bioscience and Biotechnology, Banasthali Vidyapith, Banasthali, Rajasthan, India, emails: js561734@gmail.com (J. Sharma), tripathi.rashmi@gmail.com (R. Tripathi)

<sup>b</sup>Department of Life Sciences, Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India, email: rgauravpant@gmail.com

<sup>c</sup>Department of Environmental Science, Asutosh College (Estd. – 1916), Kolkata, West Bengal, India, email: kaizar.kaizar@gmail.com

<sup>d</sup>Department of Chemistry, College of Science and Humanities, Prince Sattam Bin Abdulaziz University, P.O. Box: 83, Al-Kharj 11942, Saudi Arabia, emails: aj.ahmad@psau.edu.sa (A. Ahmad), bakhtpharm@gmail.com (Md. Afroz Bakht)

<sup>e</sup>Department of Mathematics and Statistics, Banasthali Vidyapith, Banasthali, Rajasthan, India, email: singhalka2889@gmail.com

<sup>f</sup>Malaysia-Japan International Institute of Technology, Jalan Sultan Yahya Petra, Universiti Teknologi, Malaysia, Kuala Lumpur 54100, Malaysia, email: siti-h@utm.my

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### ABSTRACT

Chromium (Cr) is a dangerous industrial pollutant that harms surface water resources and is associated with serious adverse health effects that eventually lead to mortality. In present study Cr concentrations were detected spectrophotometrically by atomic absorption spectrophotometer from October 2018 to October 2020 (in the month of October, January, April, and July) in abiotic (water and sediment) and biotic [plant (*Eichhornia crassipes* (Mart.) Solms) and fish (*Labeo rohita*)] components of Yamuna River ecosystem. Samples were collected from Vihar Ghat (Vrindavan), Mathura – 27.58387, 77.69317 (i.e., M2 site), 100 m upstream (M1 site) and downstream (M3 site) and from Renuka Ghat, Agra – 27.25190, 77.87535, India (i.e., N2 site), 100 m upstream (N1 site) and downstream (N3 site). Root, stem and leave of studied plant while gill, muscle, liver, and kidney samples of fish were used for determination of Cr toxicity. Results revealed higher concentration of Cr in water throughout the study when compared with permissible limits by WHO and BIS (0.05 mg/L). While sediment sample had the highest metal content with a mean concentration of  $51.3 \pm 2.34$  mg/L in summer 2019. The Heavy Metal Pollution Index for water, sediment, plant and fish samples at Mathura sampling site were shown to be extremely high, that is, 2,555; 31,254; 269 and 2,600 respectively, when compared to the samples from Agra sampling site. The bioconcentration factor in fish tissues was highest in gills (6.4167 in post-monsoon 2018 at Agra), and lowest in kidney (1.0417 in winters 2020 at Mathura). Such studies pave the path for future to establish the highest risk in term of time and components in the river ecosystem for their utility. Besides, such approaches and findings will help policy makers to ensure a safe and sustainable environment in terms of socioeconomics and human health aspects.

**Keywords:** Chromium (Cr); *Eichhornia crassipes* (Mart.) Solms; *Labeo rohita*; Heavy Metal Pollution Index; Bioconcentration factor (BCF)

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\* Corresponding authors.