

Impacts of tanneries wastewater on the vicinal flora of Sheikhpura and Kasur, Pakistan

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Abstract. It is of paramount concern that some leather tanneries around the world are disposing waste in environment which are a cause of destruction of flora and fauna in vicinity. Especially chrome tanning poses a major threat due to the release of chromium in wastewater (WW). Hexavalent chromium (Cr⁶⁺) is a potential carcinogen and thus demands stern quality control measures. The present investigations focused on the quality of WW released from leather tanneries of two cities *i.e.*, Sheihupura and Kasur, Pakistan, and its effect on the vicinal flora. Cr⁶⁺ and total chromium (Cr) in all the samples were determined through UV visible spectroscopy and atomic absorption spectroscopy (AAS). Wastewater samples (WWS) were collected at head and at a distance of 50 – 200 m at specific intervals, at edge and inward towards middle of WW streams. WWS of both Sheihupura and Kasur tanneries showed comparable Cr⁶⁺ content at head but much higher total Cr (*in parenthesis*) in later *i.e.*, 89.7 ppm (1440.57 ppm) and 94.9 ppm (3527.95 ppm). Cr⁶⁺ content declined inward stream and with the increasing distance down the stream falling exponentially in Sheikhpura and steeply at Kasur. The soil samples (SS) at 3 m *i.e.*, at edge of WW streams showed higher Cr⁶⁺ content for Sheikhpura than WWS *i.e.*, 94.8 ppm (1041.8 ppm) falling with distance to 44.8 ppm at 150 m. It is less at Kasur *i.e.*, 80.5 ppm (4465.9 ppm) falling sharply with distance at 150 m to 25.1 ppm. This showed buildup of Cr⁶⁺ ions in soil of Sheikhpura with time. As the distance off stream on the ground increased, both Cr⁶⁺ and the total Cr declined and much more at Kasur site *i.e.*, 23.8 ppm (880 ppm) and reached close to Sheikhpura 32.7 ppm (610 ppm) at 150 m. Plausibly, the Sheikhpura tannery is older and/or the soil in vicinal area is more porous. Plant vegetation examined in soil at edge only, show the uptake of both Cr⁶⁺ and total Cr. Roots and grass leaf at Sheikhpura and the potato leaf at Kasur showed the highest Cr⁶⁺ uptake of the total Cr *i.e.*, 4.6% 3.5% and 6.4 %, respectively. The results show that tanneries WW has drastically affected soil and consequently the plants with Cr⁶⁺ ions and total Cr above the permissible levels of 0.1 ppm. To ratiocinate, these will finally incorporate in food chain ultimately damaging the fauna and henceforth calls for adoption of effective removal methodologies and greener routes for a sustainable environment.

Keywords: tannery wastewater; chromium (VI); total chromium; flora.

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