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Persistence of heavy metals in Mathura (birth place of Lord Krishna), India: Risk assessment to animal health

Atul Prakash, Shaikh Mohd Zoheb, Rajesh Mandil, Anu Rahal and Satish K Garg
U P Pandit Deen Dayal Upadhyay Pashu Chikitsa Vigyan Vishwavidyalaya Evam Gau Anusandhan Sansthan, India

Introduction: Rivers present a potential source of environmental pollution in India. River Yamuna is the largest tributary of the holy river, Ganga in North India and is responsible for surface water supply of several cities located on its way downstream viz. Delhi (Capital of Republic of India), Mathura (birth place of Lord Krishna), Vrindavan and Agra. It also serves as a major drain for these cities.

Methods: The present study was conducted to assess the degree of heavy metal contamination of surface water, agricultural soil and the fodder crops grown in the catchment area of river, Yamuna in the Mathura district of Uttar Pradesh (India). Surface water, soil and fodder samples were collected from different villages in Mathura District, processed and analyzed for lead, copper, cadmium, mercury, arsenic and iron using Atomic Absorption Spectrophotometer (AAnalyst 400 Perkin Elmer).

Results: The results showed presence of all the heavy metals beyond the national and international permissible limits in soil and fodder samples. Levels of arsenic and cadmium in soil (269.83-1891.38 ppb; 11.88–28.26 ppb) and fodder (498.71-6843.84 ppb; 0.82–11.51 ppb) in soil and fodder samples were evident in the villages nearby Mathura oil refinery area suggesting an additional load attributable to the refinery. The health risk index for cadmium (127.88) was remarkably high followed by iron (60.19) and arsenic (31.38) as compared to lead (5.01), copper (0.46) and mercury (0.06).

Discussion: Urgent attention is needed to devise and implement appropriate means of monitoring and regulating industrial and domestic effluent, and develop alternate water resources for surface water for human and animal consumption and agricultural irrigation.

dratul2510@rediffmail.com