

Short Communication

Quantitative Status of Heavy Metals in Soils of Quetta Irrigated by Sewage Water

Syed Ishtiaq Hyder^{*a}, Muhammad Ayaz Khan Malghani^b, Muhammad Maqsood Ahmed^b,
Muhammad Arshadullah^a and Addal Mir Khan^a

^aLand Resources Research Institute, National Agricultural Research Center, Islamabad, Pakistan

^bBaluchistan University of Information Technology & Management Sciences, Quetta, Pakistan

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Abstract. In soils of different areas of Quetta city, irrigated by sewage water, the highest concentration of heavy metals was found to be as follows: lead (1.38 ppm), copper (0.86 ppm), chromium (0.036 ppm), cadmium (0.29 ppm), iron (10.50 ppm), nickel (0.74 ppm), zinc (19.45 ppm) and arsenic (0.001 ppm) on average basis. The sewage water contained lead (53.26 ppb), copper (22.5 ppb), chromium (1.33 ppb), cadmium (0.53 ppb), iron (127.7 ppb), nickel (51.14 ppb), manganese (17.08 ppb), zinc (31.38 ppb) and arsenic (0.011 ppb). At each site the concentration of heavy metals and sewage water showed positive relationship.

Keywords: heavy metals, sewage water, bio-accumulation, bio-magnification

Heavy metals in environment affect human life and bio-diversity and ultimately deteriorate sustainable development. Human activities have drastically changed the bio-chemical cycles through discharge of heavy metals into the environment. Heavy metals, being non-degradable, tend to accumulate in soil, sea water, fresh water and sediments and pose risks to human consumers of the sea foods, vegetables and also to many other organisms at the same level.

Nowadays large amount of untreated sewage/industrial water is being discharged into surface bodies for disposal (Saleemi, 1993) which may contain non-essential heavy metals in large amounts and which could be transferred to animal and human beings through food chain (Malla *et al.*, 2007; Ghafoor *et al.*, 1994). Sediments are ready sink or reservoir of pollutants including trace metals (Becker *et al.*, 2001; Muohi *et al.*, 2003).

The main anthropogenic sources of heavy metals are various industrial sources including former and present mining activities, foundries and smelters, and defuse sources such as piping, combustion bio-products, traffic, detergents, welding, batteries and leather tanneries.

For determining the status of heavy metals in soil of Quetta, in summer, soil samples were collected from Habib Nala, Hudda, Samungli and Barori and sewage water samples were collected from Habib Nala, Hudda, Samungli, Mariaabad and Angle Road. Drinking water samples were also collected from Shahbaz town, Jinnah

town, Pashtoonabad, Mariaabad and Satellite Town. After removing the stones, drying and grinding, the soil was sieved through 2 mm wire mesh. (MAFF, 1986). The sample were then digested and analyzed using atomic absorption spectrometer.

All the analyzed sewage water samples (40 in number) contained on an average (ppb) lead 53.26, copper 22.5, chromium 1.33, cadmium 0.53, iron 127.7, manganese 17.08, nickel 51.14, zinc 31.38 and arsenic 0.011 ppb (Table 1).

It was observed that the results relating to heavy metals in the sewage water were quite below the National Environmental Quality Standards of EPA for sewage

Table 1. Heavy metal concentration in sewage water of Quetta and NEQS

Elements	Average conc. (ppb)	NEQS (ppb)
Lead	53.26	500
Copper	22.50	2000
Chromium	1.33	1000
Cadmium	0.53	100
Iron	127.7	2000
Manganese	17.08	1500
Nickel	51.14	1000
Zinc	31.38	5000
Arsenic	0.011	1000

*Author for correspondence; E-mail: hyder292002@yahoo.com

and industrial effluents. The sludge soil which was irrigated with the sewage water contained (ppm) lead 1.38, copper 0.86, chromium 0.036, cadmium 0.29, iron 10.50, manganese 3.11, nickel 0.74, zinc 19.45 and arsenic 0.001 ppm on an average. However, the values did not exceed the National Environmental Quality Standards of EPA, which are lead 60, copper 100, chromium 120, cadmium 1.6, nickel 32, zinc 220 and arsenic 14 ppm (Table 2).

Table 2. Heavy metal concentration in sludge soil of Quetta and NEQS

Elements	Average conc. (ppm)	NEQS (ppm)
Lead	1.38	60
Copper	0.86	100
Chromium	0.03	120
Cadmium	0.29	1.6
Iron	10.50	-
Manganese	3.11	-
Nickel	0.74	32
Zinc	19.45	220
Arsenic	0.001	14

Though small quantities of such heavy metals are found in the natural environment but the anthropogenic activities augment their concentration.

There could be a number of sources responsible for the presence of these heavy metals in the sewage water and sludge and subsequently in soil. All of these heavy metals, individually or in combination, are used in many products and activities. Most of the manufacturing plants and service providers discharge the effluents resulting from their activities as such without any treatment into the environment.

Some of such responsible sources/activities, for example, may include metal and chrome plating, dyes, paints, leather processing, fertilizers, pesticides, wood preservatives, PVC, automotive parts, electrical and electronic equipment, petrol and lubricating oils, mineral ores and alloys etc. and the list goes on. Wear and tear of many products and consumer items also release heavy metals into the environment. The former and the present mining activities carried on in Quetta may also add to the problem.

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