

## Impact of Municipal Solid waste on the status of Lead (Pb) in dumpsite soils of Sidhi Town, District Sidhi (M.P.) India

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**Abstract:** The dumpsite soil sample were taken and analyzed by Tessier extraction procedure and the concentration of Pb in the soil samples was determined using atomic absorption spectrometry (AAS), Energy dispersive X-ray, Fluorescence (EDXRF) techniques. The result obtained showed that the soil samples taken from municipal dumpsite are having more Pb concentration than that of the soil samples taken form outside the dumpsite area. The result also indicates that the metal was distributed between oxides, carbonates and carbonate organically bound fractions and that EDTA extracted the substantial amount of Pb across the dumpsites.

**Key word:** Dumpsite soil, Lead, Municipal Area, Sidhi

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### I. Introduction:

The municipality of Sidhi town (district Head quarter Sidhi district of M. P. India) is a developing city of Rewa division of M. P. (Baghelkhand region of eastern Madhya Pradesh) and densely populated, the population increasing year by year which certainly imposing various problem to municipal administration. One of the serious problems are the improper disposal of waste generated near residential areas, poor waste collection and handling etc. which are contaminating the environment.

Many researches have reported that municipal waste by and large responsible for increasment in heavy mental concentration in soil and underground water, which must have effects on the host soil, crops and humane health. Hence the environmental effect of municipal waste one highly influenced by the presence of heavy metal contents.

The level of heavy metals in the environment are increasing day by day due to various human activities. Although the municipal waste are not only responsible for this increasment nevertheless its contribution toward increasing level of heavy mental could not be ignored at any cost and hence the aim of this research work was focused to investigate the fraction of these heavy metal (specially the fractions of Pb (lead)) in the waste generated in Sidhi town along with the determination of their mobility, bioavailability and fate in order to assess the human health and ecological risk associated with the waste.

### II. Material and Methods:

For the determination of Ph (lead) concentration flame atomic absorption spectrophotometer and energy dispersive x-ray fluoescence technique were used and in the extraction procedures oxalic Acid, Na<sub>2</sub> EDTA and Acetic were used.

The soil samples were taken from three dumpsite, that is near Hiran Nalla (HN), Near Sukha Nalla (SN) and Near Gopaldas Dam (GD), where most of the waste dumped by municipality and one sample were taken outside of the dumpsite. The sample were collected during the rainy season of 2013. All the sample were air dried and sieved.

Digestion and extraction of soil was done by shaking separately 5 gram of soil sample with 10cm<sup>2</sup> of 0.05 M Na<sub>2</sub> EDTA, 1.0M of oxalic acid and 1.0M acetic acid on a hot Plate, then 4 cm<sup>3</sup> of 1.5 M HNO<sub>3</sub> was added to the residue and centrifuged. The digest was diluted to 60 cm<sup>3</sup> with distilled water and then clear digest was analyzed for Pb using FAAS (Flam Atomic absorption spectrophotometer). The blank digest was also carried out in the same way the same procedure was also done with the sample taken form outside the dumpsite for comparing the Pb concentration. For determining the total metal concentration in the various dumpsite. 5 gram of fresh sample from each site were air dried and pulverized, these were analyzed using EDXRF spectrophotometer.

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### III. Result and discussion:

The Pb concentration in the dumpsite varied from one site to another as shown in the table-1 the result indicate that GD dumpsite contained highest amount of Pb and this could be attributed to the nearness of the dumpsite to residential areas, main road and various anthropogenic activities. All the dumpsite taken for study are having Pb content above the permissible limit of 200 mg/kg. The similar result have also been obtained from the ANOVA (Analysis of variance), considering all it has been concluded that there is no significant difference in the lead concentration across the three dumpsite taken for study.

The lead distribution in the dumpsite varied form one site to another site. The metal found to be present in the carbonate/organically, oxides and in carbonate phases. The Pb. Concentration existed as a carbonate/organically fractions was found highest in all the dumpsite, therefore Pb is said to be organically bound species and hence bioavailable, mobile in these sites and this is in agreement with the investigation carried out by other authors in similar situation.

The Ph of the dumpsite SN and GD is acidic, while that of HN site it is basic, indicates that the presence of metal scrap in waste material and other anthropogenic activities are responsible for Ph to be acidic. While the dumpsite HN, where Ph was basic, indicates that bioavailability of lead decreases with increasing ph.

From the ANOVA done indicates that there is a significant difference in the Pb extracted using three extraction media employed. Form Duncan multiple range test it was established that dumpsite SN had the highest concentration of Pb followed by HN and GD respectively as shown in fig.-1. Similarly with the EDTA extraction medium the Pb concentration was found to be high as compared to the other medium that is oxalic and acetic acid an shown in fig-2.

### IV. Conclusion:

This research work reveals that the level of Pb in the soil of all dumpsite was more in comparison to its permissible limit and hence it could be said that the area surrounding to dumpsite is being polluted.

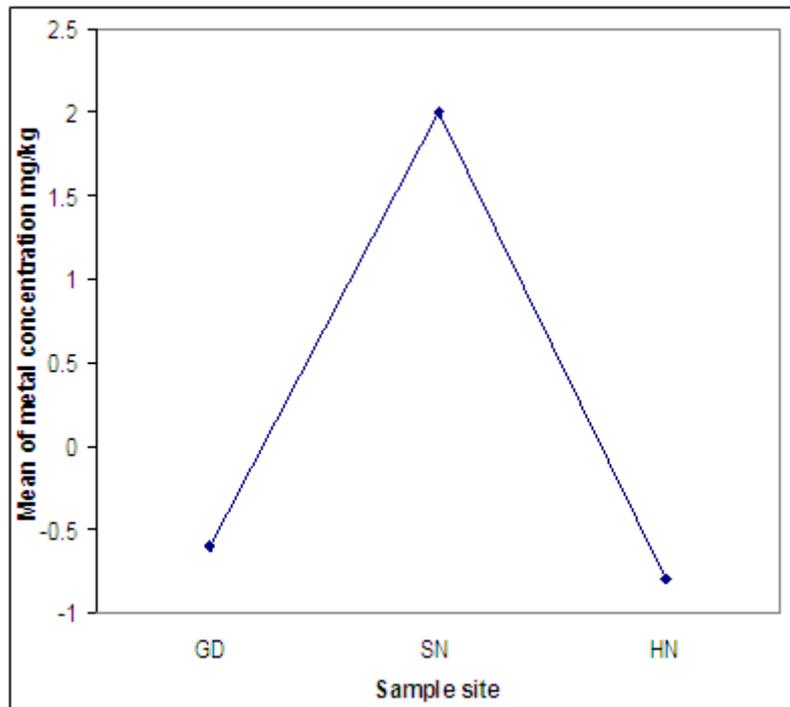
The contamination of the soil by Pb can be attributed to various anthropogenic activities at the dumpsite. So it is suggested that municipalities should undertake various measure to gearup the effective management of solid waste so as to reduce the level of heavy metals for keeping the environmental safe and healthy.

### Reference:

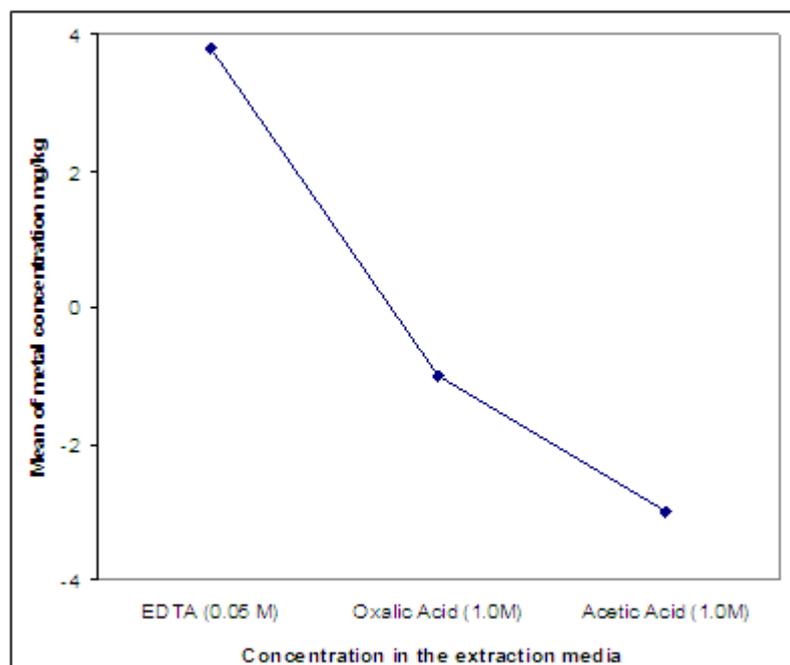
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**Table 1: Result of lead concentration in the dumpsite across the sample location (The result are mean values (mg/kg))**

Sample Site	PH	EDTA (0.05 M)	Oxalic Acid (1.0M)	Acetic Acid (1.0M)	Total lead concentration mg/kg
HN	8.28	6.76	ND	ND	665.44
SN	5.40	0.69	1.1	4.39	843.44
GD	5.38	3.58	ND	ND	1136.44



**Fig- 1 : Mean Plot for Pb concentration in the dumpsite**



**Fig- 2 : Mean Plot for Pb concentration in the extraction media**