Extended Abstract

Track SE (Sustainable Environment, Bio-innovations for Climate Action**)**

Characterization of Fine Fraction Mined from Legacy Municipal Solid Waste Dumpsite

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Dumpsites have been a common way of disposing waste throughout the world. Unscientific disposal of Municipal Solid Waste (MSW) leads to contamination of groundwater and underlying soil because of generation and seepage of leachate [1]. Degradation of organic matter also leads to emission of methane gas due to absence of the cover layer ultimately resulting in global warming [2]. In developing countries like India, rapid urbanisation and shortage of space for disposal of new waste are separate concerns altogether. Landfill mining, also known as biomining, is gaining popularity around the world for two reasons; reclamation of dumpsite for remediation and potential secondary resources for reuse [3]. Landfill mining is the process of extracting minerals or resources from waste that was previously dumped and buried in the ground [4]. Various researchers around the world have studied the economics and feasibility of material extraction by landfill mining along with the compositional analysis and characterization of the mined residues. The utilization routes of landfill mined residues have also been suggested in various studies to ascertain the sustainable end-use of the residues. The mined residues generally consist of combustible fraction, non-combustible fraction like metals, and soil-like material. The focus of this study is the characterisation and potential utilization routes of soil like material or fine fraction (FF) mined from legacy waste. The fine fraction (<35 mm) for this study was obtained from the Boragaon dumpsite in Guwahati, India where biomining is underway for the reclamation of land. The initial characterization of the fine fraction has been carried out to determine its properties for utilization in different civil engineering applications. The experimental results and the inferences are discussed below,

1. As shown in Table 1, the total organic content (TOC) in the fine fraction accounts to about 10.2% which makes it difficult to use as earthfill or embankment material in an unrestricted manner. The fine fraction either needs to be treated or mixed with local soil before reusing as an embankment material and further investigation has to be carried out to ascertain this.
2. The nutrient content in the fine fraction as shown in Table 2, is noteworthy due to anaerobic conditions that prevail at a dumpsite during degradation of the MSW.
3. The total heavy metal content in the fine fraction is excessively high in comparison with different regulatory limits for compost as well as earthfill material. The heavy metals could become bioavailable for plant uptake or leach into the surrounding soil during precipitation thus contaminating the groundwater and soil. Hence, the FF cannot be used as a soil conditioner for agricultural crops because of high concentration of total heavy metals.

   More results will be presented in the full-length paper.

References

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Table 1 Physical and Chemical characteristics

Sr.No	Parameters	Value	Unit
1.	Moisture Content (M.C)	31.69 ± 2.7	%
2.	Volatile Solids (V.S)	18.34 ± 0.4	%
3.	pH	6.60 ± 0.07	%
4.	Total Organic Carbon (TOC)	10.19 ± 0.22	%

Table 2 Nutrients

Sr.No	Parameters	Value	Unit
1.	Total Nitrogen (TN)	2.6 ± 0.35	%
2.	Calcium (Ca)	6.6 ± 2	%
3.	Potassium (K)	9.4 ± 0.1	%
4.	Sodium (Na)	5.8 ± 0.45	%

Table 3 Total Heavy Metals

Sr.No	Parameters	Value	Unit
1.	Cadmium, Cd	287 ± 80	mg/kg
2.	Copper, Cu	2165 ± 372	mg/kg
3.	Nickel, Ni	5266 ± 740	mg/kg
4.	Lead, Pb	8540 ± 1237	mg/kg
5.	Zinc, Zn	7901 ± 325.5	mg/kg