

Municipal Solid Waste

Studies of CPCB

Status of MSW Management in 59 Cities.

CPCB sponsored a project to NEERI on "Assessment of Status of Municipal Solid Wastes Management in Metro Cities and State Capitals" with a view to establishing database on National level for selected 59 cities. The selected cities include 35 metro cities and 24 State capitals. The objectives of the study is to collect field data on composition and characteristics of municipal solid waste alongwith determination of waste generation rates. Field studies for all the 59 cities have been completed. Studies have revealed that waste generation rate varies from 0.12 to 0.60 kg per capita per day. Analysis of physical composition indicates total compostable matter in the waste is in the range of 40-60 percent while recyclable fraction was observed between 10 and 25 per cent. The moisture content in the MSW was observed to vary from 30 to 60 per cent while the C:N ratio was observed to be in the range of 20-40.

Based on the study, suggestive guidelines for management of MSW are indicated and each local body will have to prepare detailed project report estimating requirement of tools and equipment and fund estimates.

Methane Emission from MSW Disposal Sites.

Most of the waste disposal sites in the country are uncontrolled dumps. These sites are constant threat to ground water contamination and emits several gases including methane. Due to various variable factors, it becomes difficult to estimate correct quantities of such gaseous emissions. With this background, CPCB instituted studies on estimation of landfill gases in collaboration with IARI and NEERI.

Organic matter content in the deposited MSW at the landfill site tends to decompose anaerobically leading to emission of volatile organic compounds and gaseous by products. Emission of gaseous products from landfills

commonly called landfill gas (LFG) contains methane and carbon dioxide as major constituents. LFG has potential for non-conventional energy, which also contributes to greenhouse gas effect, if not managed properly. The study involved development of methodology for monitoring LFG emissions from the landfill at Nagpur and validation of methodology at other landfill sites.



For the studies, flux box method was used for LFG flux emission measurement. The unit consist of a rectangular box (60cm x 33 cm x 70 cm) of plexiglass provided with support of MS angles. The box is provided with ports for collection of LFG samples and recording the inside temperature initially, the monitoring was carried out at Bhandewadi disposal site, Nagpur and validity of the methodology was tested at Sukhali landfill site in Amravati (6.0 lakhs population). The LFG emission flux for landfill site at Nagpur was observed in the range of 0.57 to 16.5 mg/m²/sec while for Amravati landfill sites the LFG emission flux was in the range of 0.67 and 0.88 mg/m²/sec. The results of study indicated that the established methodology for Nagur landfill site could be very well applied for the other landfill sites in the country.

Characterization of Compost Quality and its Application in Agriculture.

CPCB undertook detailed studies on characterization of compost quality and its application on agricultural

crops. Seven compost plants were studied for characterization of compost quality. Studies indicated that average concentration of heavy metals in the raw waste that was fed to the various compost plants was in the range of 47 to 185 mg per kg in respect of lead, 36-63 mg/kg for nickel and 1.5 to 6.5 mg/kg for cadmium. The levels of mercury in raw waste was between 0.01 and 0.23 mg/kg. Heavy metals in the finished compost were ranging as follows; Pb; 108-203 mg/kg; ni- 8-80 mg/kg; cd-3.8-12.4 mg/kg and mg – 0.01-0.31 mg/kg.



India has a good potential for the production and use of MSW based compost and sewage sludge generated in various metros and municipalities.

The research has been largely restricted to its production, composition etc. Relatively few studies have been conducted on its safe and economic disposal and its application on agricultural land in different cropping system. An analysis of manorial potential of MSW compost and the sewage-sludge is needed.

The project taken up by Central Pollution Control Board with IARI attempts to cover the safe and beneficial use of MSW compost and sewage sludge in agriculture vis a vis its environmental impacts based on extensive experimentations and a review of the scientific literature.

It has been observed that the growth attributes of wheat/ maize and vegetable crops viz., plant height, number of cobs/tillers/m², dry matter production and leaf area index, were increased due to supply of nitrogen through combination of different doses of urea with compost/ sewage sludge.

Assessment of Health Status of Conservancy Staff and other Community landfill MSW

A study was instituted by CPCB on assessment of health status of conservancy staff and other community associated with handling of solid waste management. The study was taken-up at Kolkata through Chittaranjan Cancer Research Institute and at Chennai with the assistance of Sri. Ramchandra Medical College. The objective of the study is to assess health status of each target group involved in handling of municipal solid waste (MSW).

Studies at Kolkata



Health assessment studies at Kolkata included clinical examination of 732 individuals of which, 376 were conservancy workers, 151 ragpickers and 205 controls. After detailed examination, the findings of the study are summarized as under;

	-	--	-----	-
<i>Upper respiratory symptoms</i>	43	82	93	<i>Infection in nose, throat</i>
<i>Lower respiratory symptoms</i>	32	80	89	<i>Infection in lung</i>

<i>Impaired lung function</i>	43	84	71	<i>Breathing problem</i>
<i>Sputum neutrophilia</i>	13	53	64	<i>Infection, Inflammation</i>
<i>Elevated AM number</i>	12	65	85	<i>High PM₁₀ exposure</i>
<i>Larger and multinucleated AM</i>	8	23	32	<i>Sustained high pollution load</i>
<i>Multinucleated giant cell</i>	2	5	10	<i>Bacterial infection</i>
<i>Curschman's spiral</i>	2	4	5	<i>Obstruction in airways</i>
<i>Goblet cell hyperplasia</i>	2	16	25	<i>Elevated mucus production</i>
<i>Elevated siderophage count</i>	6	34	44	<i>Covert lung hemorrhage</i>
<i>Elevated micronucleus count</i>	8	68	82	<i>Chromosome break</i>
<i>Low hemoglobin, RBC in blood</i>	17	32	45	<i>Anemia</i>
<i>Leukocytosis</i>	7	26	34	<i>Infection</i>
<i>Elevated platelet count</i>	12	62	75	<i>Cardiovascular rish</i>
<i>High platelet P-selection</i>	9	55	87	<i>Do</i>
<i>Low CD 4+high CD8+cells</i>	11	42	78	<i>Altered immunity</i>
<i>Low CD20+high CD56+cells</i>	12	54	89	<i>Do</i>
<i>Sputum eosinophilia</i>	11	28	36	<i>Allergy, asthma</i>

Con=Control. RP=Ragpickers. MSW=conservancy staff of Kolkata Municipal Corporation