International Journal in Physical and Applied Sciences
Volume 10 Issue 05, May 2023 ISSN: 2394-5710 Impact Factor: 6.915
Journal Homepage: http://ijmr.net.in, Email:
irjmss@gmail.com Double-Blind Peer Reviewed Refereed Open Access International Journal

ASSESSMENT OF WASTE MANAGEMENT IN REGARDING PHYSICAL COMPOSITION OF MUNICIPAL SOLID WASTE GENERATION

S Ravi

(Research Scholar)

Dr. Krishan Pal (Professor)

(Research Supervisor)

Glocal School Of Science

Abstract

The accumulation of "Municipal Solid Waste (MSW)" in India has substantially enhanced due to adjustments to lifestyle and nation's fast population expansion. In methods, all samples were estimated to have a moisture content following their collection. Using a hand sifting method, the physical composition of the waste components was separated. The weight of the refuse was determined directly by utilising a weight balance following the segregation. Results depicted that the average values of biodegradable content were 62.07%, combustible content was 17.8%, recyclables were 13.3%, inert content was 4.0%, hazardous content was 0.4%, and infectious content was 0.5%. The waste management includes decomposition technique has garnered attention as an effective solid waste management strategy due to its eco-friendliness and capacity to generate beneficial bioproducts, including biofertilizer and biopesticides.

Keywords: Municipal Solid Waste, segregation, physical composition, management

1. Introduction

The accumulation of "Municipal Solid Waste (MSW)" in India has grown significantly due to changes in culture and an increasingly fast population rise. (Priyadarshini and Abhilash, 2020). It encompasses both domestic and commercial waste, which constitutes a relatively minor portion of the total solid refuse discharge in developed countries (Kumar and Agrawal, 2020). Numerous complications may arise for the inhabitants of an area as a result of the accumulation of a substantial quantity of refuse "(Nanda and Berruti, 2021)".

Municipal solid waste is typically composed of household and commercial waste (Kaza et al., 2018). It may also encompass refuse generated by civic amenities, street cleansing, and construction and demolition waste from local authority sources (Guo et al., 2021). It can vary not just among nations but also across regions within a same nation. (Gupta et al., 2015). The study's overarching goal is to evaluate current practices in disposal with respect to the mechanical makeup of MSW.

2. Material and Method

2.1 Sampling procedure for "physical composition of MSW"

The representative municipal solid waste in the refuse stream was collected using this procedure. The initial phase in the random sampling method, as per the "American Society for Testing and Materials (ASTM)". These bags typically contain 15 or 20 kilogrammes per unit (MSW trucks). Wood, paper, class, and green refuse were the categories into which the waste was divided. Each category was weighed using a weight balance.

All samples were estimated to have a moisture content following their collection. Using a hand sifting method, the physical composition of the waste components was separated. The weight of the refuse was determined directly by utilising a weight balance following the segregation.

The physical components of Mettupalayam Municipal Solid Waste were classified into six primary groups: "biodegradable, combustible, infectious, recyclable, hazardous, and non-recyclable (inert)."

(i) biodegradable waste consists of vegetable waste from "the kitchen and market, garden debris, coconut shell, egg shell, timber and poles, coir, fibre, textiles (cotton and wool), and food refuse".

(ii) combustible waste includes paper, rubber, jute, and cotton.

(iii) Recyclable waste includes metal (ferrous and non-ferrous), "LDPE (the plastic material used for packaging can be considered as rag), nylon, polythene bags, and HDPE. Glass, cans, and pet vessels"

(iv) Inert materials include sediment, sand, human hair, and debris, as well as construction detritus (such as tiles, stones, bricks, and concrete).

(v) Infectious waste includes blood-soiled cottons, expired medication, nappies, syringes, and other sanitary refuse.

(vi) Hazardous waste encompasses oil, paints, batteries, disinfectants, pesticides, electric and electronic waste (circuit boards, batteries, wires, etc.), and paints. For each physical component in the trash, the usual and ranged amounts were determined for all seasons.

3. Result and Discussion

"Physical Composition of MSW"

In the primary collection samples, the average biodegradable content was 52.52%, combustible 13.33%, recyclables 20.45%, and inert 14.7%. The average values of biodegradable content in the secondary collection samples were 48.65%, combustible content was 10.3%, recyclables were 18.7%, and inert content was 17.8%.

The average values of biodegradable content at the treatment site were 49.3%, combustible content was 24.7%, recyclables were 13.0%, inert content was 12.4%, hazardous content was 0.4%, and infectious content was 0.5%. The disposal site contained biodegradable content (17.9%), combustible content (14.7%), recyclables (44.3%), inert content (15.8%), hazardous composition (1.0%), and infectious composition (5.6%).

In general, between a quarter and eighty-five percent of urban solid trash in nations with low to middle incomes is organic material that can be broken down into usable compost, as stated by Singh, (2020). Likewise, it is observed that Mettupalayam's refuse stream contains a substantial amount of organic content.

According to Cho et al. (2020), the waste composition contains a ratio of 30.51% for recycled waste that is of economic significance. Education should be implemented to encourage the public to be circumspect about recycling(Goel, 2017). The typical value and range of MSW physical components in pre-monsoon samples are illustrated in Table 1.

Table 1 Physical components in the waste stream - pre-monsoon

Components	Primary Collection		Secondary Collection		Temporary Storage		Treatment Facility		Final Disposal	
	Range Min-Max (gm)	Typical (gm)	Range Min-Max (gm)	Typical (gm)	Range Min-Max(gm)	Typical (gm)	Range Min-Max (gm)	Typical (gm)	Range Min-Max (gm)	Typical (
1 Plastics	5-58	20.50	6-15	12.00	8-32	21.17	12-24	18.40	29-65	43.40
2 Papers	20-166	68.17	10-104	32.50	16-36	27.60	14-27	19.00	0-20	20.00
3 Card board /Corton/ Corrugated	8-26	17.17	12-48	31.00	24-50	34.83	15-36	24.40	20-40	32.50
4 Sticks / wood	20-86	49.71	14-70	49.17	25-56	43.00	42-65	49.00	0-95	95.00
5 Stones/silt/gravel	57-180	110.14	20-162	67.83	43-72	57.50	40-105	78.75	95-140	128.00
6 Glass	2-7	4.83	5-15	8.75	6-25	13.20	8-16	11.67	14-80	56.00
7 Iron(steel)	2-5	3.50	5-22	9.60	5-28	13.40	12-20	15.33	11-65	38.67
8 Coconut shell	20-45	37.50	45-52	48.50	25-45	35.00	24-46	36.67	35-145	70.60
9 Rags (free plastics)	60-206	123.57	82-167	126.88	112-165	143.00	115-180	148.83	210-270	245.83
10 Bio degradable/Wet waste /Organic	463-561	123.00	148-577	532.13	491-571	524.50519 - 583543.17	148-577	532.13	0-119	119.00
11 Coir / Fibre /Jute sac	0-25	25.00	Nil	Nil	0-20	20. 00	0-46	46.00	Nil	Nil
12 Rubber	0-5	5.00	0-20	20.00	25-65	41.50	0-20	20.00	Nil	Nil
13 Cloth	4-46	25.0	20-50	34.13	29-56	43.40	24-44	30.00	30-80	56.50
14 Aluminium	0-5	5.00	3-4	3.50	0-7	7.00	7-10	8.50	Nil	Nil
15 Egg shell	0-28	28.00	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
16 Ash	12-20	16.00	0-34	34.00	Nil	Nil	Nil	Nil	45-70 56.00	
17 Thermocol	0-15	15.00	0-10	10.00	0-15	15.00	Nil	Nil	40-58	46.0
18 Food waste	0-52	52.00	14-56	34.00	0-25	25.00	Nil	Nil	Nil	Nil
19 Construction waste	35-112	86.33	35-106	63.25	52-124	80.00	34-75	55.00	50-85	63.67

20 Sanitary waste	0-56	56.00	0-74	74.00	0-50	50.00	0-40	40.00	Nil	Nil
21 Bio medical / expired medicine	Nil	Nil	7-15	11.50	12-20	17.33	12-44	24.40	45-70	58.33
22 Bone	Nil	Nil	0-12	12.00	Nil	Nil	Nil	Nil	Nil	Nil
23 Battery	Nil	Nil	0-18	18.00	0-22	22.00	0-25	25	Nil	Nil
24 Pet bottles	Nil	Nil	Nil	Nil	0-6	6.00	Nil	Nil	Nil	Nil
25 E waste	Nil	Nil	Nil	Nil	20-35	25.00	20-24	22.00	20-60	43.17
26 Leather	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0-30	30.00
27 Sieve reject	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	156-240

4. Conclusion

The refuse stream analysis results indicate that the quantity of solid debris was influenced by the cultural activities of the town. The waste exhibits minor variations in its physical and chemical characteristics across different seasons. “The waste stream analysis revealed that biodegradable, combustible, recyclable, inert, hazardous, and infectious” waste were present from primary collection to the final level of disposal. This may be attributed to inadequate segregation at the source level. Consequently, the partially segregated waste was sent for windrow composting, which resulted in a decline in the quality of the compost.

5. References

1) Priyadarshini, P., & Abhilash, P. C. (2020). Circular economy practices within energy and waste management sectors of India: A meta-analysis. *Bioresource Technology*, *304*, 123018.
2) Kumar, A., & Agrawal, A. (2020). Recent trends in solid waste management status, challenges, and potential for the future Indian cities–A review. *Current Research in Environmental Sustainability*, *2*, 100011.
3) Cho, E. J., Trinh, L. T. P., Song, Y., Lee, Y. G., & Bae, H. J. (2020). Bioconversion of biomass waste into high value chemicals. *Bioresource technology*, *298*, 122386.
4) Arya, S., & Kumar, S. (2020). E-waste in India at a glance: Current trends, regulations, challenges and management strategies. *Journal of Cleaner Production*, *271*, 122707.

5) Nanda, S., & Berruti, F. (2021). Municipal solid waste management and landfilling technologies: a review. *Environmental chemistry letters*, *19*(2), 1433-1456.

6) Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: a global snapshot of solid waste management to 2050*. World Bank Publications.

7) Guo, W., Xi, B., Huang, C., Li, J., Tang, Z., Li, W., ... & Wu, W. (2021). Solid waste management in China: Policy and driving factors in 2004–2019. *Resources, Conservation and Recycling*, *173*, 105727.

8) Gupta, N., Yadav, K. K., & Kumar, V. (2015). A review on current status of municipal solid waste management in India. *Journal of environmental sciences*, *37*, 206-217.

9) Goel, S. (2017). Solid and hazardous waste management: an introduction. In *Advances in Solid and Hazardous Waste Management* (pp. 1-27). Springer, Cham.

10) Singh, S. (2020). Solid waste management in urban india: imperatives for improvement. *ORF Occasional Paper*, *283*.

DECLARATION

I as an author of this paper / article, hereby declare that paper submitted by me for publication in the journal is completely my own genuine paper. If any issue regarding copyright/ patent/ other real author arises. The publisher will not be legally responsible. If any of such matters occur publisher may remove my content from the journal website/ updates. I have resubmitted this paper for the publication, for any publication matters or any information intentionally hidden by me or otherwise, I shall be legally responsible.

Name: S Ravi