Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.7891

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2019) *7*(6), 146-151

Research Article

Composition and Characterization of Municipal Solid Waste Generated in Nanded City, Maharashtra India

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Received: 9.11.2019 | Revised: 12.12.2019 | Accepted: 17.12.2019

ABSTRACT

In the modern era, solid waste management, generation, segregation and disposal has raised serious problems in the urban region. Solid waste has hazardous impact and has negative influence on the environment. In this paper composition and characteristics of the solid waste was studied in the Nanded city. Solid waste composition was studied by segregating the solid waste into organic and inorganic components. The organic components include paper, leaves, kitchen waste, wooden material, cloths, and gunny bags. The inorganic components of the waste include plastic, rubber, debris, bones. The observation provides us the data percent composition of organic and in organic waste. Organic characteristics of solid waste were carried out p^H*, moisture content, electrical conductivity, potassium, phosphorus, nitrogen and organic carbon. The analysis of organic component of the waste indicates that the nutrient content present in it can be used for the agriculture purposes and the inorganic part of the waste should be land filled properly.*

Keywords: *Organic, Inorganic solid waste, Composition and Characteristics.*

INTRODUCTION

Solid waste is the term used for the solid content and by product of different activities carried out by human being within the municipal area of that particular city. Waste widely contains thrown out materials like plastic, paper, ash, rubber, glass, metals etc. the generation of the solid waste is not constant everywhere, the amount of the solid waste generation depends upon the income of the particular city or area (Sunil Namdeo Thitame et al., 2009) .

The values of the solid waste generation in high income countries are 2.75 to 4.00 kg/C per day. While as in low income countries the value of the solid waste generation is 0.5 kg/per day. The rate of solid waste goes increasing day by day much faster than the rate of urbanization (Hoornweg & Bhada-Tata, 2012).

Cite this article: Dar, M.A. & Patwari, J.M. (2019). Composition and Characterization of Municipal Solid Waste Generated in Nanded City, Maharashtra India, *Ind. J. Pure App. Biosci. 7*(6), 146-151. doi: http://dx.doi.org/10.18782/2582-2845.7891

The rate generation of solid waste has intensified with in past decade from 0.68 billion tons per year to 1.3 billion tons per year from 2000 to 2010 (Ahsan et al., 2016). It has been estimated that rate of solid waste will become 2.2 billion tons per year by 2025 and the rate will be 4.2 billion tons per year by 2050 (Hoornweg and Bhada-Tata, 2012). The increasing rate proportion of solid waste depends upon the population of the area and it requires more land for disposal (Indries et al., 2004).

Composition and characteristics of solid waste depends upon certain things like food habit, topography, different seasons and commercial status of the city, etc. Due to diverse nature of municipal solid waste and its process of management which includes treatment and its disposal is still a forgotten practice in highly and densely populated cities of India. With increasing urbanization of Indian cities the disposal problems of solid waste becomes more difficult in urban area. At the same time, the proportion of solid waste per unit area is much more than land proportion availability for its disposal.

Many Asian cities are under serious pressure in solid waste management. It has been found that in India 90 percent of the solid waste is dumped off without taking any specific measures, which puts some serious effect to environment (Sengupta Sanjay et al., 1998).

Organic matter content in solid waste is high and prime attraction for the flies, mosquitoes and rodents, growth of bacteria and decomposition is favorable due temperature and humidity it also causes unpleasant smell and odour which are prime source of different diseases and effect natural beauty of the area (Sharma, 2005). Therefore, it is the prime concern to study composition and characteristics of municipal solid waste which will provide us best practice for managing solid waste of city.

Table 1: components and composition of Nanded city

sr. no	Components of solid waste	Composition (g/2kg)	Composition (%)
Organic			
1	Paper	248	12.4
2	Leaves	294	14.7
3	kitchen waste	270	13.5
4	wooden material	134	6.7
5	Gunny bags	104	5.2
6	Others	330	16.5
	Total	1380	69%
Inorganic			
1	Plastic	90	4.5
2	Rubber	80	4
3	Rocks, bricks and stones	190	9.5
4	Bones	31	1.55
5	Glass	50	2.5
6	others	179	8.95
	Total	620	31%
Grand total organic + inorganic		2000g	100

MATERIALS AND METHODS

Study Area:

Nanded city is well urbanized and is famous town of area on the religious basis in Nanded district of Maharashtra and geographical location of the city lies between 19°5'52'' to 19°12'31'' North latitude and 77°16'55'' to 77°21'1'' East longitude. Nanded is the largest eighth city of Maharashtra and its area is about 61.44 Km^2. 550,439 is population of Nanded city according to the census 2011. Due to the diverseness in utilization pattern, living worth and high status of income, the waste produced are of diverse nature, which results increased contribution to solid waste generation as compared to other cities per capita generation.

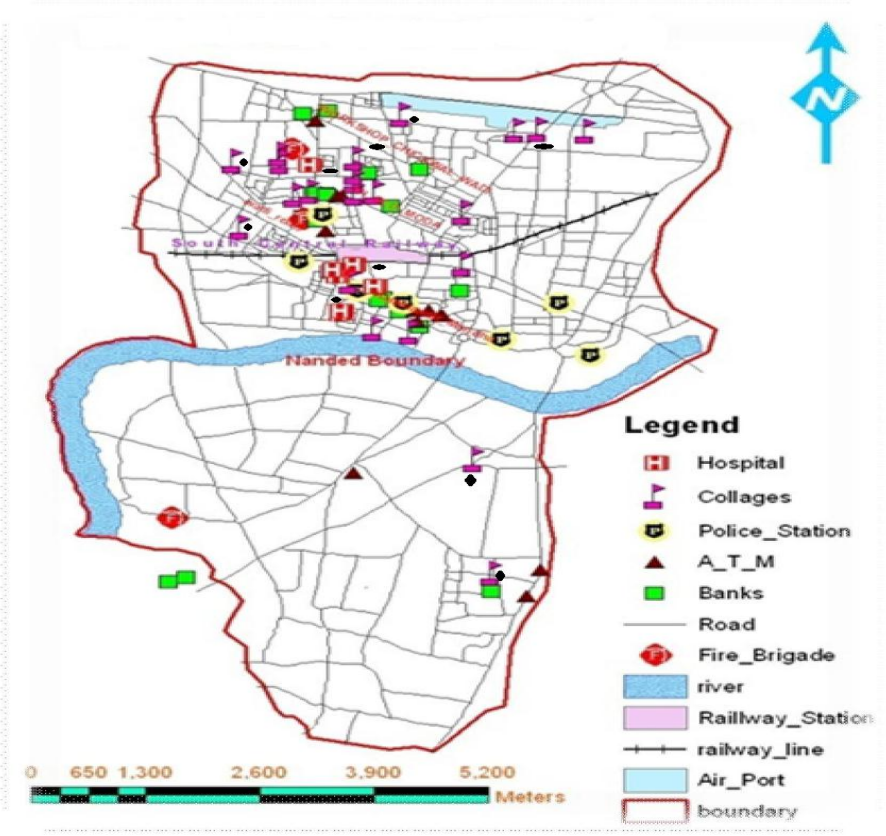

Fig. 1: Showing sample collection site of Nanded city and site

The rate of solid waste generation is 240 Metric tons per day of Nanded city; the rate may increase at the time of festivals and other celebrations. Thus it is of greater importance to study composition and characteristics of the solid waste generated which will provide us better management and to reduction its impacts to environment. In this paper, researcher has computed composition and characteristics of solid generated from Nanded city.

To calculate the details on solid waste, we need waste generation information, its quantity and its disposal management. Therefore in present paper hand operated survey was carried out, as the generation of the waste mainly depends on urbanization of the city, living status, income of people, topography of the area, different seasons etc. after completion of survey, samples of 2kg were collected on monthly basis from ten selected site of the city during August 2017 to July 2018 as shown in the figure 1 represented by black dots. Likewise mixed samples were also collected from the dumping site of the city.

MATERIALS AND METHODS

The samples collected from various six sampling site were brought to the laboratory

and mixed together were segregated with help of composite method (Sivapalan et al., 2002). An inorganic waste content was weighted singly and its information is presented in the table 1. The remaining organic content of the waste was dried, reduced to small pieces with help of grinding and then it was sift through a sieve of 0.45-mm. The results obtained after analysis are presented in Table 3.

Table 2: Showing analytical technique used to determine the parameter.

Sr. no.	Parameter	Technique used
1	pH	pH Meter
2	Electrical conductivity	Conductivity meter
3	Moisture Content	Air oven dry
4	Nitrogen	Kjeldhal method
5	Phosphorus	Calorimetric method
6	Potassium	Flame photometer

RESULT AND DISCUSSION

Analysis shows us from table 1 that organic component is the main content of municipal solid waste quantity which is 69% of all waste produced in the city. Though, inorganic content of the waste accounts for only 31% of total waste.

Pie diagram were plotted from table 1 of organic and inorganic content and representation were showed in figure 2 and 3 respectively. The observation shows us that the major portion of the organic waste is from leaves 14.7% followed by kitchen waste 13.5%, paper 12.4%, wooden material 6.7%, gunny bags 5.2% and other account for 16.5% which cannot be separated from the waste. The above waste generation is the result from day today and weekly market held in Nanded city, due to the large domestic sector and various activities held in the hotels and restaurants, cleaning of roads, paper used for covering of food material and other things and cutting of trees, in the city.

Figure 3 provides us the data regarding inorganic content of the waste which is mainly contributed by rocks, bricks and stones study reveals of about 9.5%, followed in the lineup by plastic 4.5%, rubber 4%, glass 2.5% , bones 1.55% and other account for 8.95% and it cannot be separated from the municipal waste. Organic waste are mainly added to the municipal solid waste due the various activities like construction and demolition of the of different structures, thrown out material from our living places like shampoo bottles, mugs, bags, buckets etc. and other activities are also responsible for the addition of the waste in this category.

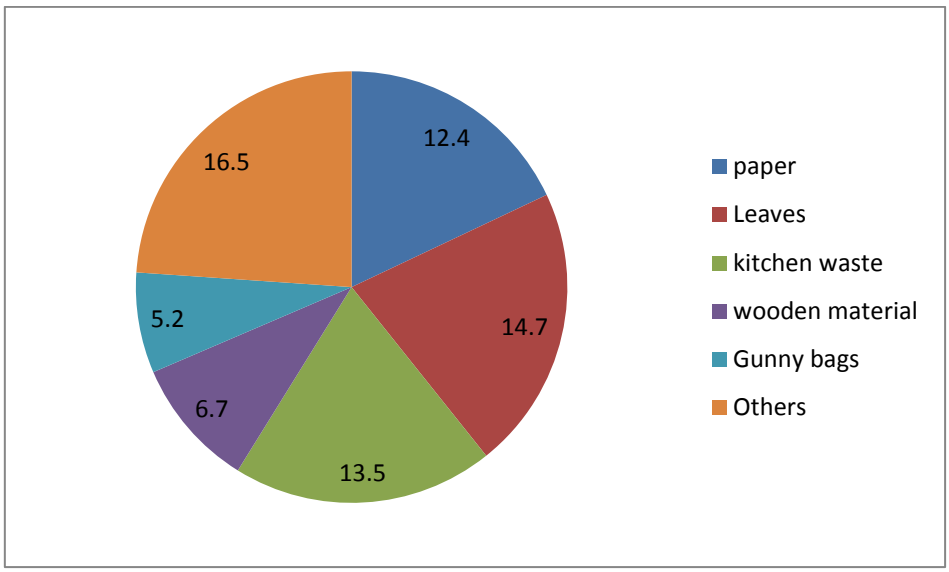

Fig. 2: Organic content percent composition of municipal solid waste of Nanded city

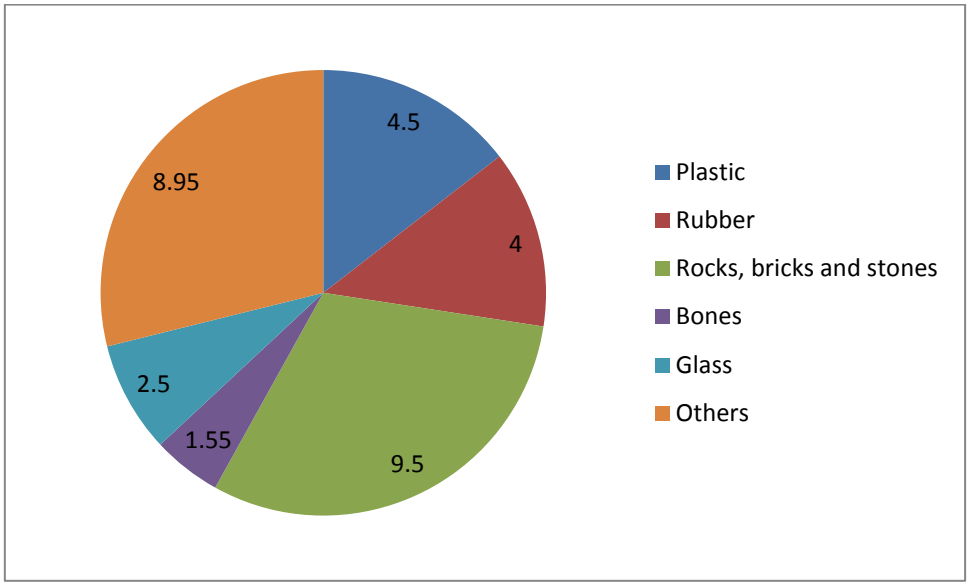

Fig. 3: Percent content of Inorganic composition of municipal solid waste of Nanded city

Table 3: Showing characteristics of organic solid waste from municipal solid waste of Nanded city

sr. no	Parameter	Value
1	pH	7.4
2	EC (mhos)	3.7
3	Moisture Content (%)	34.7
4	Organic Carbon (%)	37.3
5	Nitrogen (%)	0.78
6	Phosphorus (%)	0.83
7	Potassium (%)	0.42

It has been raveled from the table 3 that moisture content of the waste refuse is 34.7%. This large amount of moisture content present in the waste refuses which mainly comes from the hotels and restaurants of the area and from the household kitchen of the area (Sharma & Gupta 2006). Organic carbon content of the solid waste is about 37.3% it may be due to ash and various other carbon containing materials. Organic matter Nitrogen content is 0.78% it is due presence of vegetables content of the waste, it is contributed by the vegetable market and by kitchen waste of the city. The phosphate and potassium content of the waste is 0.83% and 0.43% respectively. The values provided by observation gives us information that organic matter content of the city waste has a great potential for crop nutrients if organic matter is first composted then used for the fertilizers in the field (Sharholy et al., 2007).

CONCLUSION

Results obtained from study show us that the organic content of municipal solid waste has high nutrient value. The organic content of the waste can be decomposed and used as fertilizers. Composition percent is high in organic content inorganic content. The solid waste should not mix with other waste because its moisture content will increase due which contamination and foul smell may surround the nearby places.

Acknowledgement

Authors are thankful to Netaji Subashchandra Bose College Nanded, S.R.T.M University Nanded, for providing necessary laboratory

facility to the authors for carrying out required analysis.

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