MANAGEMENT AND DISPOSAL OF MUNICIPAL SOLID WASTES IN YAVATMAL DISTRICT OF MAHARASHTRA STATE OF INDIA AND HOUSEHOLD UNIT FOR WASTE MANAGEMENT UNIT

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Abstract - Proper waste management may be a basic key to environmental property. During this study, the municipal solid waste management and disposal ways in Yavatmal district in Maharashtra state of India is given. The characteristics and composition of those wastes and therefore the environmental problems related to its management also are investigated. Structured questionnaires were accustomed acquire primary knowledge from a random size of population within the areas that have the best accumulation of plenty of solid wastes within the Government selected waste selling sites and open areas on the main streets among the metropolis. Environmental and health problems arising from the unsustainable management of the wastes were studied throughout this project. The results indicates that the waste dump sites (designated and non-designated) on the main streets and several other open areas are left unattended for long periods specified the rubbish heaps; encroach on the roads thereby limiting the road users access, generate serious pollution problems, represent important nuisance once blown over by winds, and distorts the aesthetic read of the metropolis. The results conjointly show that the composition of the wastes within the metropolis is heterogeneous as a result of it contains each perishable and non-biodegradable materials like e-wastes, plastic, synthetic resin materials, hospital wastes, and hair designer's wastes amongst others. The study was created on characteristics of organic and inorganic waste and experiments were conducted for conversion this waste into their byproducts. Finally the analysis highlights the importance of incorporation of the 4Rs Associate in nursing participation of all stakeholders with the event of an integrated waste utilization depot within the residential estates.

Keywords - Organic and inorganic waste, municipal solid waste management, Plastic oil, Compost, Recycling.

I. INTRODUCTION

Solid waste refers to any solid or semi-solid substance or object ensuing from human or animal activities, discarded as useless or unwanted. It's a particularly heterogeneous mass of wastes, which can originate from home, commercial, industrial or agricultural activities. Solid waste could be a broad term that encompasses all types of waste like Municipal Solid Waste (MSW), Industrial Waste (IW), unsafe Waste (HW) and Bio-Medical Waste (BMW). It consists of organic and inorganic constituents which can or might not be perishable. One hand, the reusable elements of solid waste may well be helpful as secondary resource for production processes. On the opposite hand, a number of its nephrotoxic and harmful constituents might cause a danger if not handled properly. In India, things of Solid Waste Management (SWM) is grim, notably in urban regions. The management of MSW is entrusted to civic bodies within the urban areas, that looking on their monetary resources, pay on a mean, regarding five to twenty five per cent of their total budget on SWM. It's rumored that in additional than forty Indian cities, the municipal agencies pay around Rs.50-150 per capita per annum on SWM. Most of the ULBs, report shortage of funds jointly of the most barriers for achieving a correct MSW Management. A scarcity of potency is obvious in the least stages of SWM i.e. collection, transportation, treatment and disposal. There's no conception of supply separation and solely mixed waste is collected in most of the cities. The staff handling waste do thus in extremely unsanitary and unhealthy conditions. Sanitary landfills aren't practiced and waste is drop unattended, in open sites, leading to many hazards. The state of SWM in geographic region, notably in its major cities, is of significant concern. There square measure many environmental, economic and social problems hooked up with the SWM that square measure to be addressed by the state. A number of these problems are highlighted in earlier studies undertaken for geographic region and Gujarat (Sharma et. al., 1997). Majority of cities and cities within the state adopt the community-bins system of assortment and, except in few cities, the number of waste generated daily isn't recorded. The number of recyclables collected by informal sector, involving lakhs of rag pickers, isn't best-known. The waste isn't appropriate for thermal treatment attributable to its low hot worth and high wet content. Biological process ways like composting, vermi-composting, biomethanation, etc., are tried with restricted success. Per capita MSW generation in various towns of the state ranges between 100 and 600 gm. per day.

In Yavatmal Total MSW generation is 24 MT/day out of which 12 MT/day is from domestic sources, 5 MT/day is from commercial sources and remaining 7 MT/day is from other sources which include education institution, Hotels and restaurants, public

buildings etc. Waste collection system of Yavatmal city covers 21000 houses and more than 200 persons are involved in collection and management of MSW. The composition of MSW in Yavatmal is as follow:

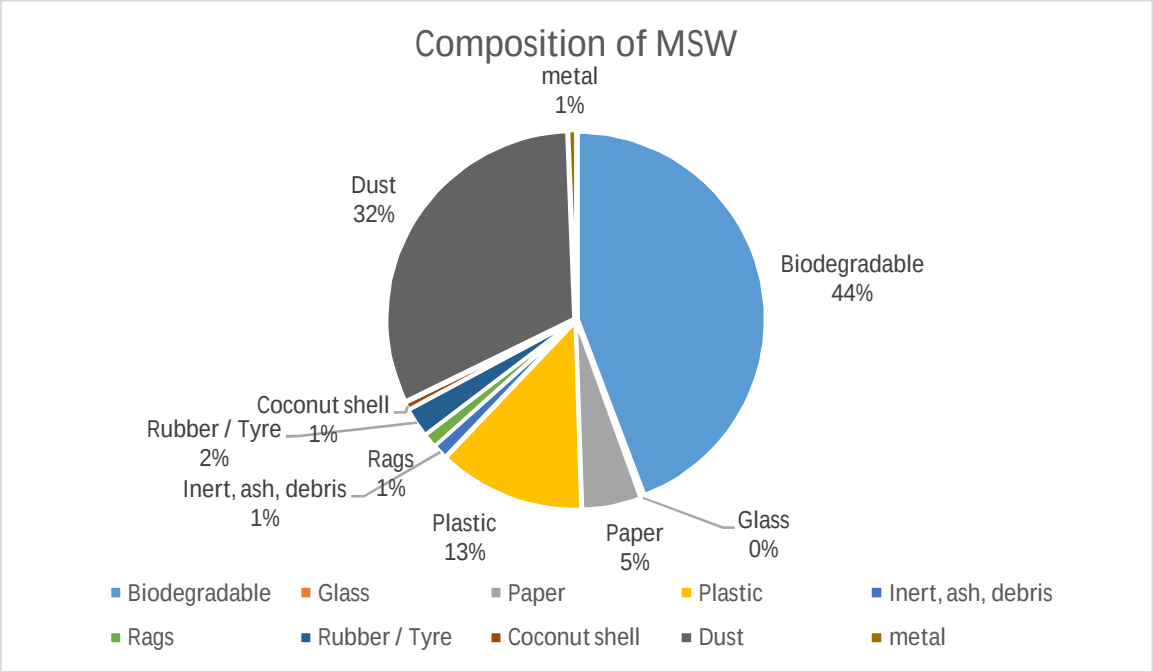


Chart no 1: Physical characteristic of MSW in Yavatmal (Yavatmal Municipal Council-2017).

II. MATERIALS AND METHODS

2.1. Site Description

In this project random 200 houses in Yavatmal city was taken. No of peoples, their age and amount of waste generated was noted.

2.2. Sampling Preparation

In particular, two hundred houses were randomly selected and studied on the critical aspects of municipal solid waste management and disposal such as; evacuation of the waste from the dump sites, composition, disposal methods, environmental impacts and management of the municipal solid waste in Yavatmal. Other relevant primary source of data used in the study were extracted from the field observations of the municipal solid waste in the waste dumping sites where the composition, dump sites, and typical environmental issues in Yavatmal where studied.

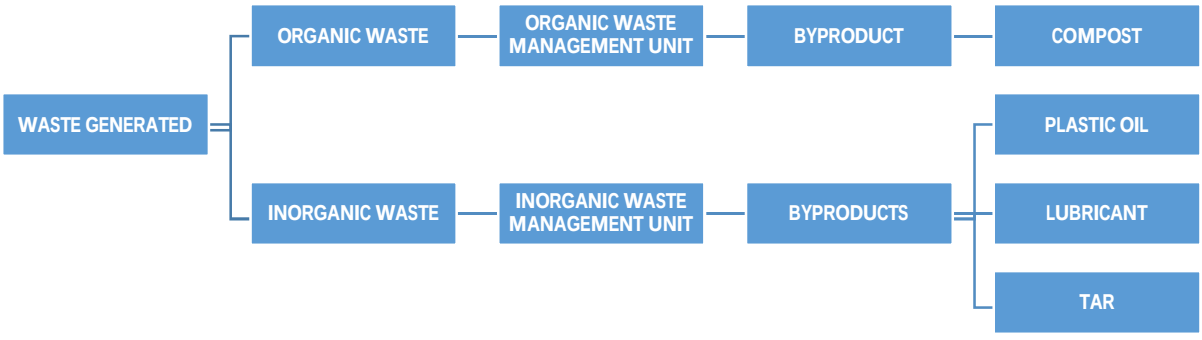


Fig no 1: Schematic representation of waste management system.

2.3 Materials

Waste generated from this houses were separated into mainly two type's organic and inorganic waste. Organic waste comprising of fruits, leaves, dead plants, waste food, cardboard, garden waste etc. and inorganic waste like plastic bottles, plastic bags, broken plastic items, flex etc. organic waste was put

into organic waste management unit and inorganic waste was put into inorganic waste management unit.

2.4 Pyrolysis Process

The transmutation method is a sophisticated conversion technology that has the flexibility to supply a clean, high-calorific price fuel from a large style of biomass and waste streams. It's the thermo-chemical decomposition of organic material at elevated temperatures within the absence of gas. The transmutation provides varied operational, environmental and economic benefits. Fraught and warmth, the long chain polymers of element, oxygen, and carbon decompose into short-chain fossil oil hydrocarbons with a ceiling length of around eighteen carbons. Organic compound molecules from the fundamental materials area unit split within the reactor at 70–240 ℃. The reduction of method temperature takes place from 300–350 ℃ to 240 ℃. The upper yield of liquid fuel of concerning 95% it absolutely was achieved.

2.5 **Composting Method**

Composting could be a process that converts heterogeneous organic wastes into humus like substances by mixed microorganism population beneath controlled optimum conditions of wet, temperature and aeration. It's the side of management that separates composting from natural putrefaction or decomposition processes that occur in an open dump, landfill, or unmanaged waste pile. In composting, microorganisms convert organic materials like manure, sludge, leaves, fruits, vegetables and food wastes into product like soil humus. Through composting organic waste materials area unit rotten and stable into a product that may be used as soil conditioner and/or plant food. Decomposers embody microorganism, actinomycetes and fungi that area unit widespread in nature. These area unit native to soil, dust, fruit and substance and wastes of all kinds, thus special organisms don't seem to be needed (Rodrigues, 1996). Controlled decomposition happens as a results of activities of those present microorganisms. Composting may be thought of as microorganism farming, in order that they want energy, food, and home ground. These microorganisms need carbon as energy supply and N to make proteins. Microorganism turn out enzymes to interrupt down complicated carbohydrates into easier forms, and use them as food. Composting method continues till the remaining nutrients area unit consumed by the last microorganisms and most of the carbon is regenerate into carbonic acid gas and water. The nutrients that become accessible throughout decomposition stay within the compost at intervals the bodies of dead microorganisms and in humus.

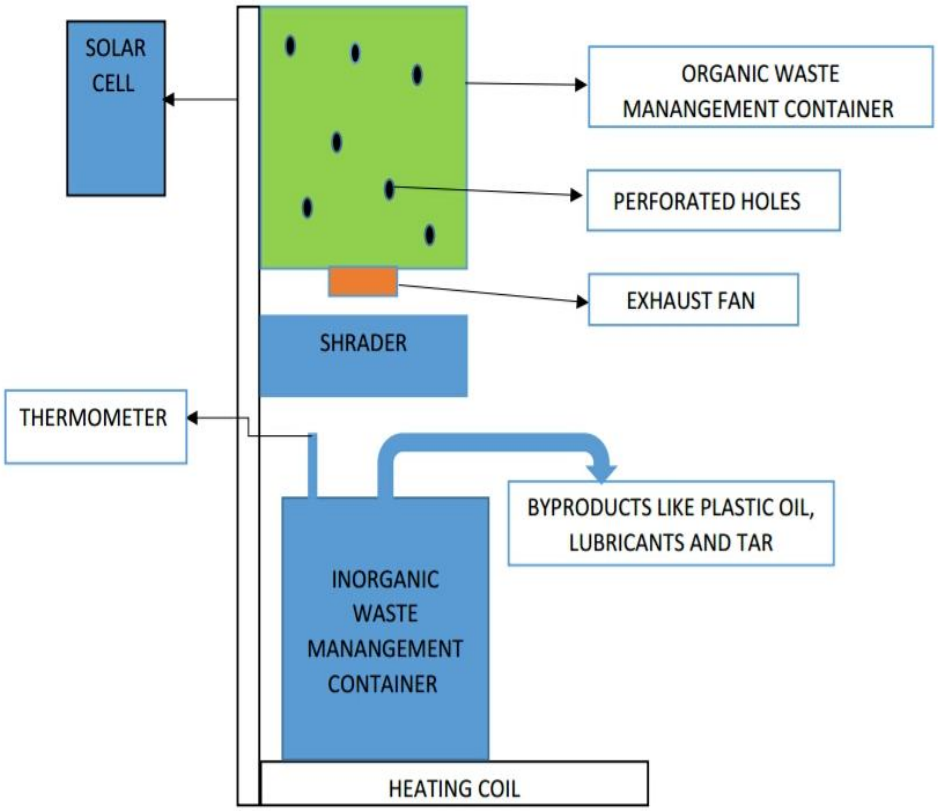


Fig no 2: Schematic diagram of household waste management unit

III. RESULTS AND DISCUSSION

Laboratory test was performed on the plastic oil from the inorganic waste management unit, the following values of various parameters were obtained.

Plastic oil was extracted by putting 100 gm. of inorganic waste in organic waste management unit. The various amount of plastic obtained at various temperature is give in table 1. Chart 1 shows that production of plastic oil increases from 50℃ to 250℃ from 55 ml to 95 ml per 100 gm. of inorganic waste but further increase of temperature leads to reduction in amount of plastic oil, chat shows the peak value of 95 ml at 250 ℃.

Table no 2: Plastic oil obtained at various temperature

SR. NO.	TEMPERATURE (℃)	PLASTIC OIL (ML)
1	50	55
2	100	68
3	150	79
4	200	86
5	250	95
6	300	87
7	350	64
8	400	53

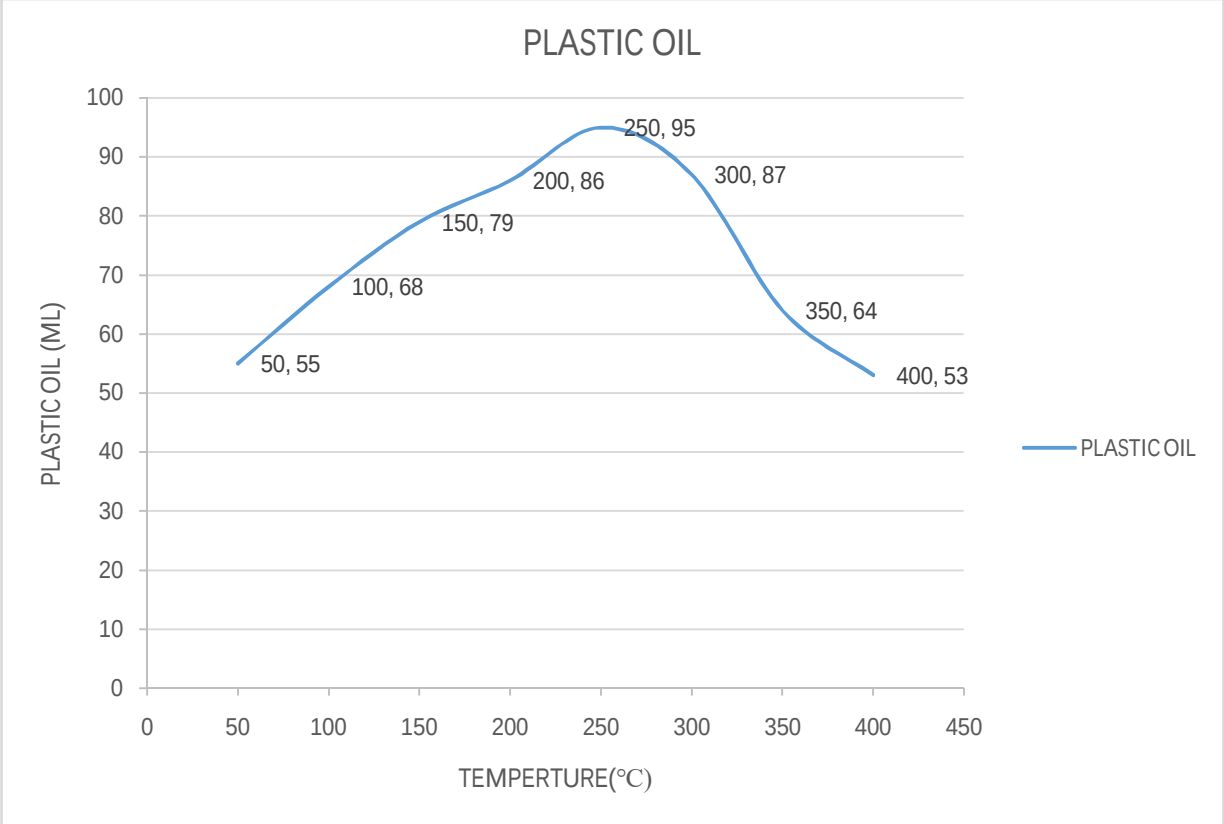


Chart no 2: Plastic oil obtained at various temperatures.



Fig no 3: Plastic oil, tar and lubricant obtained from inorganic waste.

In organic waste management unit the organic waste was put along with soil and moisture is applied, this sample used to remain in unit for ten days. After ten days compost is get formed in unit due to action of aerobic and anaerobic bacteria. The laboratory test were performed on this compost which gives following values listed in table no. 3.

Table no 3: Results of various parameter of compost

Parameter	Unit	Result
pH	-	7.9
Electrical conductivity	µS/cm	290
Nitrogen	mg/kg	932
Phosphorus	mg/kg	92.8
Potassium	mg/kg	228.1
Calcium	mg/kg	13998
Magnesium	mg/kg	1872

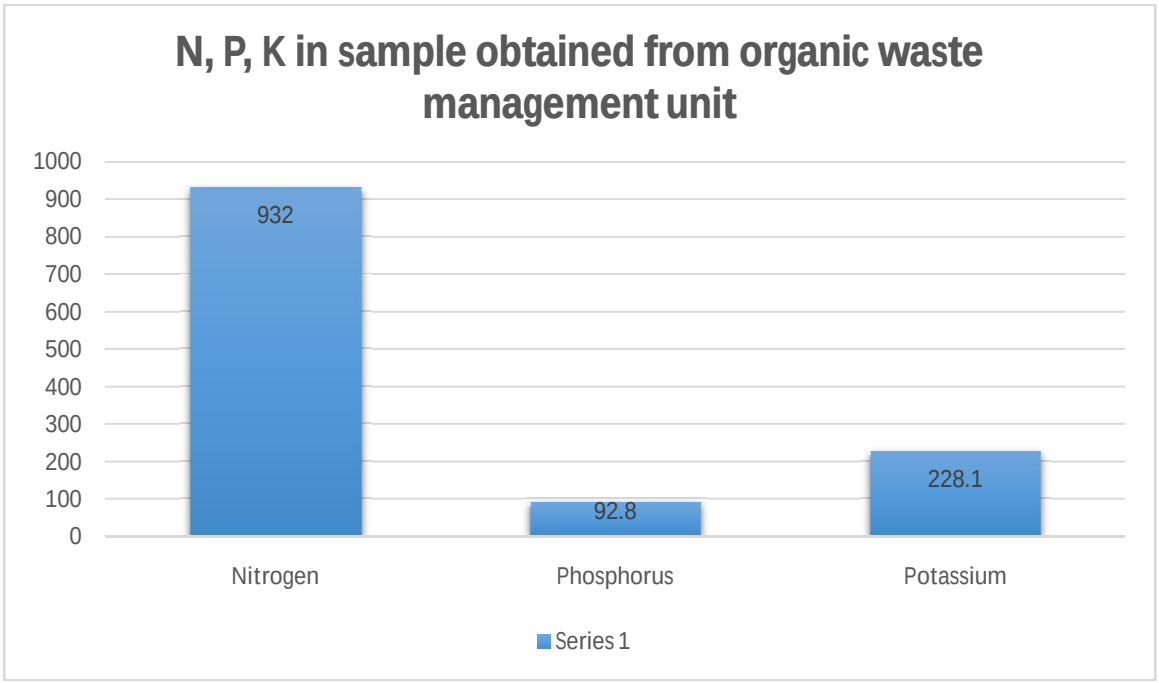


Chart no 3: N, P, K in sample obtained from organic waste management unit.



Fig no 4: Compost obtained fromorganic waste management unit.

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CONCLUSION

Form this study and analysis we can conclude the two things. First one is that with help of household unit we can convert organic waste produce in house can be converted into manure with 10-15 days in organic waste management unit. This compost is rich in N, P, and K and can be used in gardening and agriculture purpose which is economic and easy way. Second one is that inorganic waste can be converted into plastic oil, tar and lubricants. Plastic oil has high calorific value and can be used as fuel. Tar can be used in construction of bituminous pavement and lubricants can be used in lubrication purposes. Household waste management can be done with help of this unit and it is easy and economical way of waste management.

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