



REVIEW ON MUNICIPAL WASTE MANGAMENT AND DIFFERENT WAYS TO CONVERT IT INTO USEFUL FORMS IN BIOGAS PLANT

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ABSTRACT

It is known that the waste which is thrown away can be used in many different ways. Municipal solid waste (MSW) is one of the major areas of concern all over the world. In developing country like India, there is rapid increase in municipal solid waste due to urbanization and population growth. Composition of waste varies with different factors like living standard, climatic condition, socio-economic factor etc. This paper deals with the solid waste management methods and practices in India. In this paper the main focus is on municipal solid waste.

Key words: Municipal Solid Waste, Pollution, Organic Compost energy;

INTRODUCTION

Natural growth of population, reclassifications of habitation and migration trends are important in urban population in India. Global experience shows that when a country's urban population reaches almost 25 percent of the overall population (as in the case of India), the pace of urbanization accelerates (Kumar and Gaikwad 2004). National Environmental Engineering Research Institute (NEERI) has conducted extensive studies on quantum of waste generation in various cities. Studies have revealed that quantum of waste generation varies between 0.2 - 0.4 kg/capita/day in the urban centres and it goes up to 0.5 kg/capita/day in metropolitan cities. In India, the amount of waste generated per capita is estimated to increase at a rate of 1 percent to 1.33 percent annually (Shekdar 1999). Under the business as usual (BAU) scenario the total waste quantity generated in 2047 would be approximately above 260 million tonnes (Singhal 2001, EPTRI

1995). The estimates under the BAU scenario are made considering the average collection efficiency of waste as 72.5 percent, average depth of landfill site as 4 m and average waste density as 0.9 tonne/m³ (NIUA 1989)

Solid Waste Management (SWM) systems exist in most of the urban centres since last few decades. However, these systems have yet to emerge as a well-organized practice. Although, the solid waste characteristics in different urban centers vary significantly, there is a meager effort to tailor the system configuration to the waste characteristics (Kumar et al 2004).

Currently, more than 130 million tonnes of waste per year are incinerated at over 600 plants (Bogner 2007). Thermal processes with advanced emission controls are proven technology but more costly than controlled landfilling with landfill gas recovery; however, thermal processes may become more viable as energy prices increase. Because landfills produce CH₄ for decades, incineration, composting and other strategies that reduce landfilled waste are complementary mitigation measures (Bogner 2007). Composting has become a preferred method for municipalities and industries to recycle a variety of organic byproducts in order to apply them as soil conditioners and amendments (Butler et al 2001).

SOURCES OF BIOMASS

Municipal solid waste (MSW) mainly contains food waste, straws, leaves, fruit and vegetable wastes, among which the food waste accounts for the majority of the organic fraction of MSW. According to the reports of 2012, the MSW collected and disposed in China amounted to 1.3 billion tons. As a result, the

processing of MSW has become a big environmental problem. Currently, the main disposal method for food waste (FW) in China is landfill (90.5%), with a small percentage of FW being disposed off through incineration and composting. However, these disposal methods are problematic as the FW is putrescible. In landfill situation the organic fraction of FW will gradually produce methane, which has a global warming potential over a 100 year time, 23 times that of CO₂. Many EU countries have introduced high landfill levies, and have even banned dumping untreated MSW. Anaerobic digestion has been suggested as an alternative method for high organic content waste to recovery a renewable energy-biogas in a controlled and efficient ways, producing a potential energy source, e.g., power generation or fuel gas. Different research groups have developed anaerobic digestion processes for different organic wastes such as FW, FVW (food and vegetable waste), and the organic fraction of MSW.

COMPOSTING

Composting is defined as the biological decomposition and stabilization of organic substrates, under conditions that allow development of thermophilic temperatures as a result of biologically produced heat, to produce a final product that is stable, free of pathogens and plant seeds and can be beneficially applied to land (Haug 1993). The Indore process represented the first organized plan for composting in the modern era (Haug 1993). The first full-scale refuse composting facility in Europe was established in the Netherlands in 1932 and was a modification of the Indore process (Epstein 1997). Many advances have been made in the field of sludge composting since the 1970s because of the demise of the open dump (Golueke and Diaz 1987, Kuter 1985). The efficiency of composting stages depends on a variety of parameters, including aeration, temperature, content of moisture in the compost, pH, methods of composting and composition of the mixture to be composted. Of prime importance, however, are the microorganism species involved and the activity thereof (Neklyudov et al 2008).

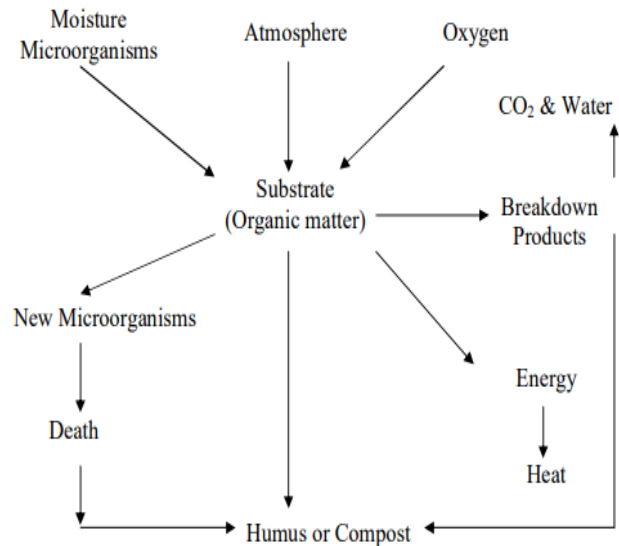


Fig.1 Composting process

COMPOSITION OF MUNICIPAL SOLID WASTE

Municipal Solid Waste is generally a combination of household and commercial refuse which is generated from the living community, it includes degradable; paper, textiles, food and vegetable waste, moderately degradable (cardboard and wood) and materials of non-degradable; leather, plastics, rubbers, metals, glass and electronic waste. The MSW composition in most developing countries is highly degradable, mainly composed of an organic fraction with high moisture content.

Table 1: Municipal Solid Waste

Type	Biogas yield per ton fresh matter (m ³)
Cattle dung	55-68
Chicken litter/dung	126
Fat	826-1200
Food waste (disinfected)	110
Fruit wastes	74
Horse manure	56
Maize silage	200/220
Municipal solid waste	101.5
Pig slurry	11-25
Sewage sludge	47

Various categories of MSW are found such as commercial waste, food waste, institutional waste, street waste, industrial waste, construction and demolition waste, and sanitation waste. The higher income generate cities in India were found to generate more

MSW per capita per day basis and their waste have higher portions of packaging materials and recyclable wastes, while in case of developing cities, the proportion of compostable and recyclable wastes are very low. MSW includes degradable (paper, textiles, food waste, straw and yard waste), partially degradable (wood, disposable napkins and sludge, sanitary residues) and non-degradable materials (leather, plastics, rubbers, metals, glass, ash from fuel burning like coal, briquettes or woods, dust and electronic waste). The food wastes bears lot of moisture that contributes to the MSW to a great extent, reported that in most developing countries the highest percentage (40– 70%) of MSW consists of organic matter, which is able to retain a high moisture content.

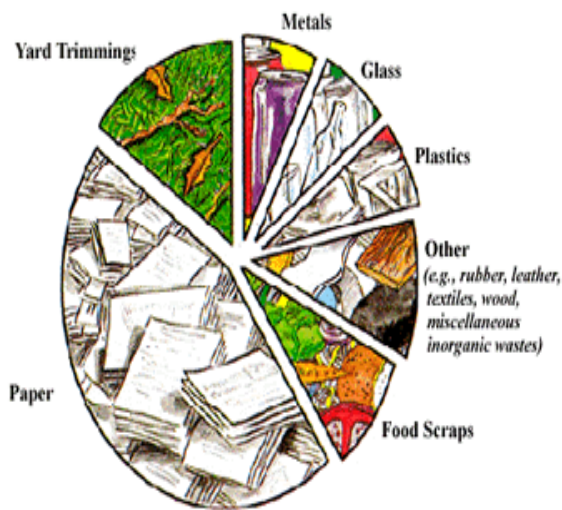


Fig. 2 Composition of Municipal Solid Waste

CONCLUSION

Municipal solid waste generated depends on population, climate, urbanization, socioeconomic criteria etc. Overall MSWM practices adapted in India at present are inadequate. It is also noted that efforts are made to improve MSWM in major cities but due attention is not paid for MSW of medium and small-scale towns. The current regulations (MSWM rules, 2000) are very stringent. Many deficiencies are identifying in the implementation of policy. Non compliances in MSWM are largely due to lack of training, financial constrains, lack of proper planning and leadership.

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