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Study on Food Waste Management in Al-Falah University

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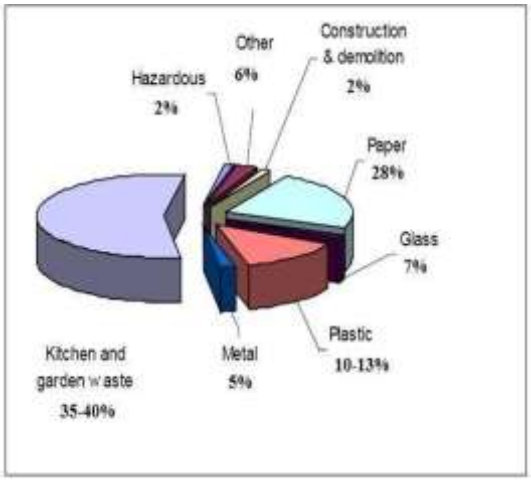
ABSTRACT: There is continuous increase in municipal solid waste (MSW) around the world which has led to extinction of resources and have resulted increase in environmental risks. Conventional treatment methods such as such as open dumping and landfilling causes environmental degradation hence there is need to find better alternative. The major portion of MSW generated in India is organic in nature; Food waste (FW) comprises the main fraction (45%) of this portion. The final destination of Food Waste mainly adopted around the world is Composting or anaerobic digestion. But there are various challenges associated with these methods hence Biofuels derived from the food waste have gained increased interest in recent years due to environmental and economic reasons. The environmental crisis and the depletion of fossil fuel have led the world to look for other alternatives which are renewable in nature and therefore production of biofuels has become an important priority. Also, food waste generation around the globe has become a new environmental concern which has tremendous potential and is not fully unexploited. For this reason, production of ethanol from food waste has become curious approach.

I. INTRODUCTION

Increase in population, rise in life standard and increase in urbanization have resulted to a surge in variation of solid waste generated and also increase in quantity. In 2002, the waste generation estimation globally was 1.4 billion tons out of which 1.2 billion tons was industrial and 1.7 billion ton was municipal solid waste (MSW). By 2040, it is estimated that generation of MSW around the globe will be approx. 95 billion (Ajnav et al., 2008). In the same way as other developing nations, India is confronting huge test in dealing with the expanding amount of Municipal Solid waste (MSW) because of its fast population development, change in way of life, relocation of individuals from rural to city zones, and numerous other reasons.

Economic benefits and minimum environmental pollution are the main objective which can be achieved by having effective waste management system. Because of expanding energy demands, budgetary requirements and environmental issues, organization everywhere throughout the world have prescribed different rules and worked on numerous issues related to management of waste.

In Indian cities waste generation rate varies from 0.35 kg/c/d to 0.75 kg/c/d (Yadava and Samader, 2017). Today, MSW generated in India annually is about 60 million tons and it is rising at a quick rate, which is projected to reach around 140 million tons by 2060 (PIB, 2015)



Organic waste is mainly generated from kitchen waste and agriculture wastes. In many developing countries organic waste contribution is increasing day by day. Although, in all these countries a very little percent of the kitchen and garden wastes are used in composting and a major

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portion goes to dumping sites and forms the most hazardous waste. As kitchen and garden waste is mostly organic, disposal of these wastes through landfilling and combusting results in unwanted situation. The landfilled waste is decomposed by microbes which result in the formation of leachate. This leachate has very serious impact on the environment mainly causing ground water contamination. Organic matter in landfills additionally frames CH4 gas and H2S gas out of which CH4 is a greenhouse effect causing gas.

Composition of food waste is so much in organic waste hence its potential cannot be ignored and therefore all the countries around the globe should make use of this potential.

II. OBJECTIVE

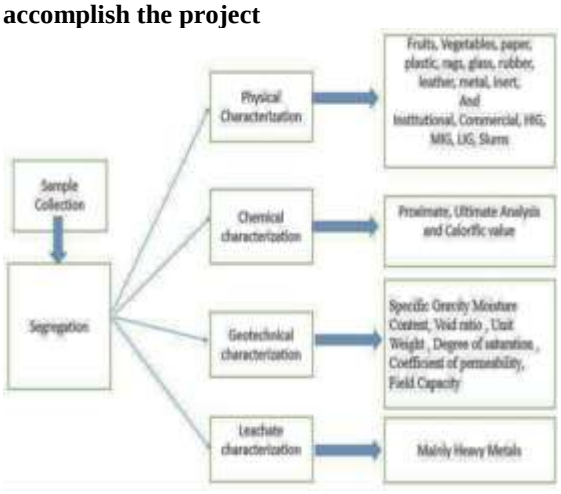
1-Quantitative and Qualitative analysis of solid waste generated
2-Design and Development of solid waste treatment Facility
3-Economic analysis of studied waste disposal system

III. METHODOLOGY

3.1 - The methodology of the study was performed by

i) By Information Collection
ii) By Survey
iii) By Analysis of Collected Data

3.2 - Flow diagram of research methodology to accomplish the project



A-Chemical Characterization of waste

"In order to perform characterization of the Chemical characterization of waste has been done to understand its potential for various waste processing techniques, like vermicomposting, composting, refused derived fuel (RDF), biomethanation and incineration. Proximate analysis involves the determination of, Volatile content (%), % ash content, and the calculation of % fixed carbon. The proximate analysis will be conducted according to ASTM standards E790 (ASTM 2004a), E830 (ASTM 2004b), and E897 (ASTM 2004c). Bomb Calorimeter will be used in order to determine the calorific values."

The ultimate analysis included determination of carbon, hydrogen, nitrogen, sulphur, and oxygen content in dry samples. The test will be carried out by a CHNSanalyser [(Model VarioEL-III) according to the ASTM D3176-09 (ASTM 2002) standard test procedures]. The oxygen content will be determined by difference, knowing the mineral content. Heavy metals will be analysed by using an atomic absorption spectrometer (model 4141, ECI). Prior to the analysis, each sample will be digested with concentrated HNO3 according to the ASTM standard method D5198-09 (ASTM 2003)

B - Leachate Testing

Testing of liquid waste (leachate) which generated from Food waste

Parameter	Actual data	Permissible limit	
BOD (mg/l)	12000		30
COD (mg/l)	22000	125	
TSS (mg/l)	24500		25
TDS (ppm)	17000	2100	
pH		5	7

C - Nutritional Value of Wasted Food & rate of generation-

The food waste that thrown away each day could provide 1217 calories, 33 grams of protein, 5.9 grams of fiber,1.7 MCG of Vitamin D, 286 mg of Calcium, 880 mg of Potassium to each person

Amount of food waste produced daily from hostels

Places	No of person	Amount of Food waste (kg)
GirlHostel	490	68.600
Boys Hostel	57880.920	
Canteen	22.820	
Other Food waste	21.700	

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D – Segregation and disposal of waste

Waste which reaches the waste treatment plant is first segregated and after that organic fraction of the waste mainly comprising of food waste is segregated and then it is sent to composting chambers for composting

IV. RESULT AND DISCUSSION

Design of food waste disposal system

Disposer Drum

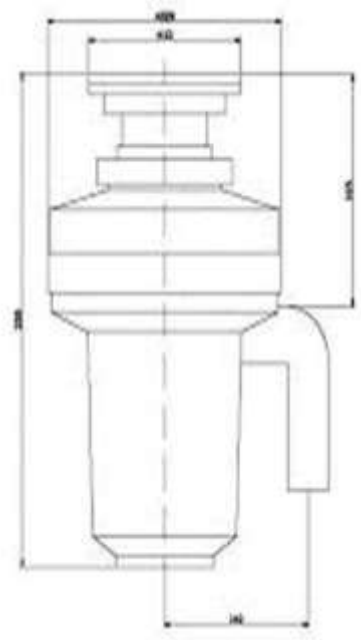
Main components,

1) Hopper
2) Disposer drum
3) Masher blade
4) Motor

Arrangement of various components of the disposer system are as follows:

1. Supporting frame is selected which holds the total assembly together.
2. sink/hopper is mounted on the frame whereas on other side motor is vertically fitted inside the casing.
3. Output shaft of the motor is connected to the masher blades which mash the waste food in fine particles.
4 Crushed waste sustenance is diverted through the outlet pipe provides just below the masher blades.
5. Disposed waste is collected in the bucket provided below the outlet pipe.
6. Screws and fasteners are used to hold the assembly together and to prevent the any leakages.

Volume $V = 3.14\ r^2\ l$
V= volume of drum
r= inner radius of drum
l= length of drum



Design Description

The transfer framework comprises of a drum produced using tempered steel, and is encased by an external barrel mounted straightforwardly on an edge. A sink structure enters from outside through the round and hollow fenced in area into the drum. A 19mm diameter shaft pass through the centre of the disposal drum vertically and spans through the one third of the length of disposal drum inside, on which a masher is mounted & is being driven by a 0.5HP motor with an average output speed of 2300rpm. The masher does the undertaking of squashing the waste materials against the inward of the transfer chamber

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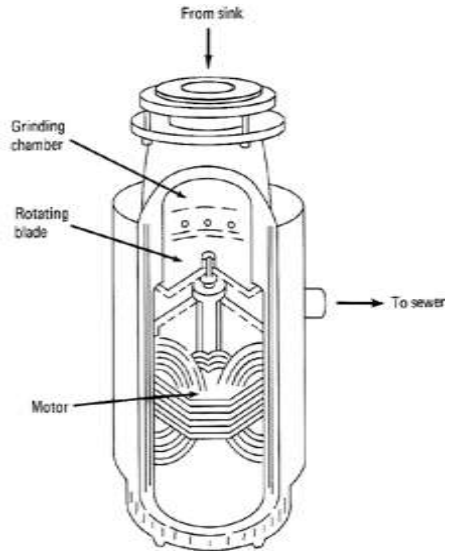

V. CONCLUSION

The Study on the current management system showed that there is no proper source segregation of waste and Food Waste is disposed of commonly with other waste produced. As the Food Waste has great potential it can be explored separately to other treatment option like ethanol and biofuel production as food waste is immediate source of starch and sugar. The Physio-chemical characteristics of conventional compost were also determined. Moisture content and pH obtained for the conventional compost were 3.72 % and 3.80 respectively which is less than the prescribed limit. As if now composing RDF, biomethanation and disposal of rejects and inert seems to be suitable waste processing technology. Organic fraction has been significant so composting should be appropriate method to process the waste.

If proper segregation of waste is done at the source then labour cost can be reduced as the number of labour employed for the segregation activity can be reduced, manufactured biogas digester which works on anaerobic digestion of agricultural and animal waste which is effective option to save cost on powerfrom anaerobic digestion process the methane gas can produce from food wastes

Microbial process of breaking up of organic waste conclude that an effective composting system for small scale agricultural processes is achievable.

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