

FINDING THE CONTENTS OF VILLAGE SOLID WASTE (IN INDIA): A TOOL TO DEVELOP A VILLAGE SOLID WASTE TREATMENT PLANT

M.S.KADAM

Department,of Mechanical Engineering.,BMIT,Solapur.Ph-9767107297,Email-kmilind2007@rediffmail.com

S.S.SARAWADE

Professor, Department of Mechanical Engineering, Wadia college Pune Email:sunilsarawade @gmail.

ABSTRACT:

Background The well connectivity of rural peoples with urban areas, educational awareness and increasing in earning capacity of rural people causes improvement in living standard. These are the main reasons of more solid waste generation in the villages. Any development and change of lifestyle of the urban people attract the rural people leading to generate village solid waste (vsw).**Purpose** Now it becomes a serious situation in villages also, i.e. Land pollution, Air pollution, and Water pollution due to VSW, hence it is necessary to take action to control this situation. **Result** This study gives a data of thirty four (34) villages about solid waste. This is in mixed form..Its analysis means its weight in Kg. In this survey experiment it is observed that maximum plastic, compostable material, ash and garbej materials are present, All VSW material is in mixed form **Conclusion** This data helps to design various segregation units of waste treatment plant. There is traditional way to collect the waste, no any segregation system is present.

KEYWORDS: Village solid waste, Ash, Scrap, Rural areas, Recycling, Compostable material,Waste to energy combustion.

1.Introduction:

Solid waste generation and its effect on environment is become a crucial problem in rural health development program. In villages a good established environment poses serious threats, similar scenario is now emerging in rural areas as well as due to the urban – rural continuum. So it becomes a big challenge in next coming days.

solid waste system is present, i.e. every family is stored separately the waste and it is utilized as a compost for agriculture purpose. But in this globalization Indian village peoples changes their life style. Solid waste is a material, that is not useful and does not represent any economic value to any human being. To improve the health of rural population the management of village solid waste need to be improved.(Dr. ArunabhaMajumder et.al.) Different activities like food habit , living standard and earning capacity of people creates more solid waste in Indian villages. Now a day, transportation facility is easily available for rural people, so they are well connected with urban areas causes the impact of living standard of urban people on the rural people.(Ayo-Babalola,Ibrahim Basu et.al). In village level the solid waste increases due to agricultural waste, Domestic waste, Animal waste. The objective of rural solid waste management is to collect waste at the source of generation, Recovery of the recyclable materials for recycling, conversion of organic waste to compost and secured disposal of remaining waste .Depending on the physical state of waste , it is categories in to municipal waste, hazardous waste , medical waste ,and radioactive waste(Ajay Kumar Varma et. al). Due to village waste pollution of water sources, Proliferation of vectors of communicable disease , foul smell and odors release of toxic metabolites , Unaesthetic ambiance and eye sore etc.(Ayo-Babalola,Ibrahim Basu et.al.) .As a result the excessive accumulation of solid waste in the urban

2. LITERATURE SURVEY:

2.1SOURCES OF VSW IN INDIAN VILLAGES:

In village level major solid waste sources are the residential, Institutional, and agricultural activities.(Ajay Kumar Varma)Table No-1 sources of solid waste

Sources	Typical Waste generators	Components
Residential	Single & multifamily dwellings	Food waste, garbage , paper ,cardboard, plastics, Textiles, glass, metal, ash, special waste (bulky items, consumer electronics, batteries, Oil, Tires) Leather , rubber, Earth, ceramics.
Institutional	School, small hotels, markets, office buildings. Small hospitals.	Paper, cardboard, plastics, wood, food waste, Glass, metals Thermocol.
Aggriculture	Farmers, Animals,	Wood, Earth,Cow dung,Animal waste, leaves, tree strings, grass, cattle food waste.
Drainage	Public , Natural	Mud, Silica, Earth

In VSW with increasing content of plastics and non-bio degradable packaging materials, It becomes unacceptable to cultivators (Ayo-Babalola, Ibrahim Basu) Basically VSW is divided into four types. Dry waste, Weight waste, Raw material, (mud, drainage, waste, silica) and medical waste.

Dry waste are generated by the households, commercials and institutional establishments and Agri waste. Weight waste (garbage, food waste) is generated due to household, small hotels, markets. Raw materials quantity in VSW is major, because in villages open drainage system is there, At the time of cleaning major raw material is collected which consists of mud and silica. Medica waste is very small quinty because one or two dispensaries are there. Agri waste mainly consists of

grass, remaining food of cattles, Cattles dung (depen on the animals quinty). In this way VSW consists of Organic and Inorganic waste.

2.2 GENERATION OF VSW:

The generation of solid waste in villages is in between 50 gm/ cap/ day to 250 gm/ cap/ day.

Rural (Peri urban or urban outgrowth)-150 to 250 gm/ cap/ day. Rural (Remote/ Tribal)- 50 to 150 gm/ cap/ day. (Dr. ArunabhaMajumder)

GENERATION OF SOLID WASTE:

Over last ten years, the handling of waste – Including reuse and recycling, collection, treatment, and disposal is improving in cities, but is limited in rural areas.

Table 2 - Municipal Solid Waste generation in Indian Cities.

S. No.	Population	Waste Generation Rate Kg/Capit/Day
1	Cities with a population < 0.1 million	0.17-0.54
2	Cities with a population of 0.1-0.5 million (11 cities)	0.22-0.59
3	Cities with a population of 1-2 million (16 cities)	0.19-0.53
4	Cities with a population > 2 million (13 cities)	0.22-0.62

Table - 3 suggest the per capita quantity of municipal solid waste in Indian cities. It also suggests that average municipal solid waste production from 0.21 of 0.50 Kg per capita per day in India. The urban population of India in approx. 341 million in 2010. From above survey is clear that whatever are the issues

2.3.HIERARCHY OF SUSTAINABLE WASTE MANAGEMEN:

In villages every family collects the solid waste and dump openly near the house called it as ukirda which is generated in house area and by the animals and Agri activity. There is no any well established system for collection and treatment of solid waste which has become a serious problem for rural environment and effects on the rural life style. Following figure shows different options hierarchy of Solid waste management at village level.(M.S. kadam)

Waste reduction - Recycling-Anaerobic composting-aerobic composting- Waste to Energy-Sanitary landfill- un sanitary landfill.

Above hierarchy shows that the waste reduction and reuse of the waste materials are the better options for minimizing the generation of waste, But it is not possible upto zero level. Once the waste is generated it need to be collected, recycling, composting and remaining for waste to energy for effective waste handling. The last option is open burning and unsanitary landfills.(Ajay Kumar Varma,)

2.4 TREATMENT OF SOLID WASTE:

The technology options available for processing the Municipal Solid Waste (MSW) are based on either bio conversion or thermal conversion. The bio-conversion

discussed uptil are related to only urban areas and the metropolitan cities, i.e. MSW management, generation of solid waste, and treatment of solid waste. So it also important to concentrate on village level areas solid waste management.

process is applicable to the organic fraction of wastes, to prepare compost or to generate biogas such as methane (waste to energy) and residual sludge (manure). Various technologies are available for composting such as aerobic, anaerobic and vermin-composting. The thermal conversion technologies are incineration with or without heat recovery, pyrolysis and gasification, plasma pyrolysis and pelletization or production of Refuse Derived Fuel (RDF). A brief account of these technologies is essential for evaluating their efficiency, applicability and impacts. He also suggested diff. processes for MSW. i.e. .composting, Bio-waste period fuel, vermi composing, Incineration plasma pyrolysis.(Ajay Kumar Varma,)

India is facing the problems related to resources required for disposal of MSW. i.e. Land, segregation machinery. and the technical expertise necessary to deal with the disposal of MSW. Waste dumps or open burning continue to be the principal method of waste disposal in India. These methods causes several accidents are continuous source of emission of harmful gases and highly toxic liquid leachate.He discussed some other methods are composting, Incineration, gasification technology, RDF plants, Land filling,(Dr. ArunabhaMajumder)

Thermo chemical treatment process are an essential component of a sustainable integrated MSW management system. Thermal process made the energy

value of solid waste into different types such as electricity and heat processes. The main thermo chemical process are combustion, pyrolysis and gasification. (M.S. kadam)

2.5 MANAGEMENT OF MUNICIPAL SOLID WASTE:

Sustainable waste management systems through the adoption of Integrated Solid Waste Management (ISWM) are analyzed as a probable solution towards solving the hazards and complexities posed by current waste management problems. Existing literature inclusive of all available sources of information used to analyses current waste management systems in the country, (K.Hadjibiros)

The need to form regulatory institutions for inspection of solid waste management practices. To create the incentives for minimization of solid waste. To establish hazardous waste management system for each economic zone. In line with a growing concern about sanitation issues, embracing both solid and liquid waste management system in urban and rural areas. It is a need to promote sanitation

3 LITERATURE GAP:

The above literature study gives in detail information about municipal solid waste generation in Indian metropolitan cities. Further study explains the technological options for treatment of municipal solid waste and its hierarchy of waste management. There is huge information about municipal solid waste treatment and its technological details. But there is very short information about village solid waste management and its treatment options and treatment plant.

4. METHODS

Authors have proposed a survey experiment to find out actual content and its characteristics of solid waste at village level. It is very helpful to give a solution to village solid waste. Experimental work is done to confirm the quantity of solid waste generation in villages to develop a village solid waste treatment plant and below steps is followed

- a) Design of questionnaire.-1) Format of questionnaire
- b) Data collection- 1) Sample data sheet
- c) Data analysis
- d) Conclusion.

4.1 DESIGN OF QUESTIONNAIRE :

Author knows that it is the basic tool to find out the correct and proper information of solid waste at village level, so it is important to design the questionnaire in all aspect of village solid waste management system. By literature survey the main ingredients in solid waste are paper, plastic, leather, Garbej ,but in village solid waste ash, compostable material and agricultural waste are major content so it is included in questions. Author concentrated mainly on the following objectives for effective questionnaire.

- The information about the actual content of the solid waste at village.
- Characteristics of solid waste at village.
- Existing solid waste management system in village.
- Existing solid waste disposal system in village.
- Existing solid waste treatment process in village.
- To collect the data for design of village solid waste treatment

The collected information become very useful for deciding the different treatment processes, and designing the plant. Following is the format used for data collection.

4.2 DATA COLLECTION:

Data of actual solid waste generated in thirty four villages are collected from government person (Gramsevak) of local body i.e. Gram panchayat.

4.3 DATA ANALYSIS:

In this analysis data is separate out and calculate actual weight of each content in Kg.

5. RESULT-Following sheet gives sample data collection sheet

Data collection of existing village solid waste management system (In India)
(Questionnaire)

1) Name & address of Village -
Takali, Tah. J. South Solapur, Dist- Solapur.

2) Name of the person/ officer handling this responsibility -
Rajeshri Babarabhab Ahire - Gramsevak.

3) Total population of the village.
 Less than 5,000 In between 50,000 to 1,00,000 More than 100000

4) "VSW" management system is existing in village
 Yes No

5) If Yes. Collection of "VSW" by
a) Small vehicles b) Manual system c) Heavy vehicles d) Any other

6) Existing disposal method of "VSW" in Village.
 Open dumping Composting "VSW" treatment plant.

7) If "VSW" treatment plant is available, capacity of the plant. i.e. Input & out put.
a) Yes No

8) Content of the VSW material.

- Paper material - 1.5 kg/ day
- Textile material - kg/ day
- Leather material - kg/ day
- Plastic material - 5 kg/ day
- Scrap Metal - Kg/day
- Ash material - 20 kg/ day
- Compostable material - 10 kg/ day
- Organic waste material - 20 kg/ day
- Medical waste material - kg/ day
- Garbej waste material - 10 kg/ day
- Rubber/Glass material - kg/ day

9) Existing Segregation method of "VSW"
a) Yes b) No

10) If Yes, Details of the Segregation system.

Seal

ग्रामसेवक
ग्रामपंचायत टाकली (जि.ज.)
ता. दक्षिण सोलापूर

5.1. DATA COLLECTION OF VILLAGE SOLID WASTE

To conduct the experiment, user is selected based on willingness, thus neglecting educational, economical, etc factors related to village selection. selection of villages from different population and economic background as stated in work sampling study. But, experimental data is picked up for thirty four samples.

Author have conducted survey of small villages of south solapur Tasil, Dist- solapur for data collection of generation of solid waste. This is sampling process.. Data is collected through filling the questionnaire. Data is filled by Gramsevak, who is authorized person of Government of Maharashtra. In this

survey selected thirty four (34) villages having population less than 5000 peoples.

6. DISCUSSION

After analyzing the information about village solid waste, got following important information of existing solid waste management system at village level in India.

- No any common VSW management system is existing at village level. It is depend on Individual family No any common Segregation system is available, mixed solid waste is collected near the home. And then it is used as compost for agriculture purpose.

- In the content of village solid waste major content is Ash , compostable material like cow dung, grass, leaves, soil, mud.

- Quantity of medical waste ,scrap, organic and leather is less.

Light weight material like paper, plastic, textile material also present in VSW content

So available data is very useful for Development of village solid waste plant

Table 01 Collected Data

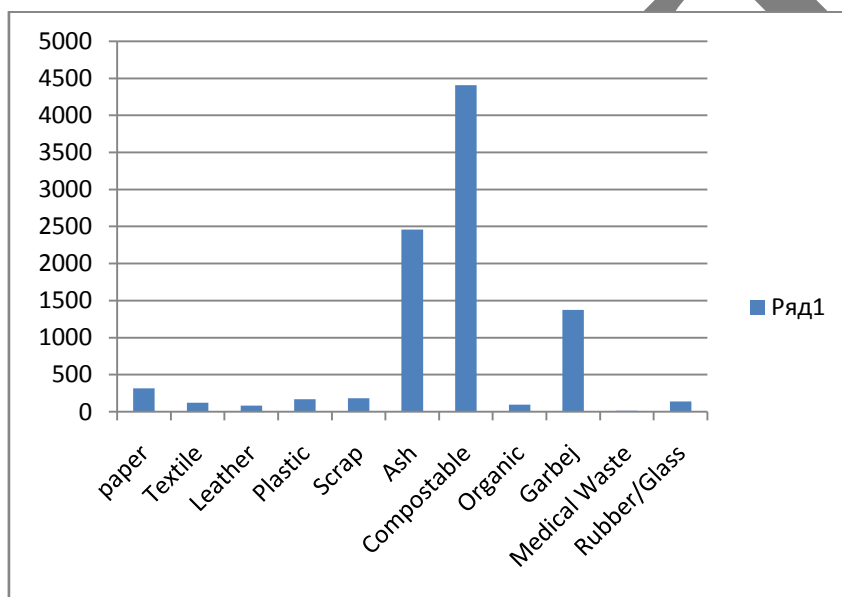
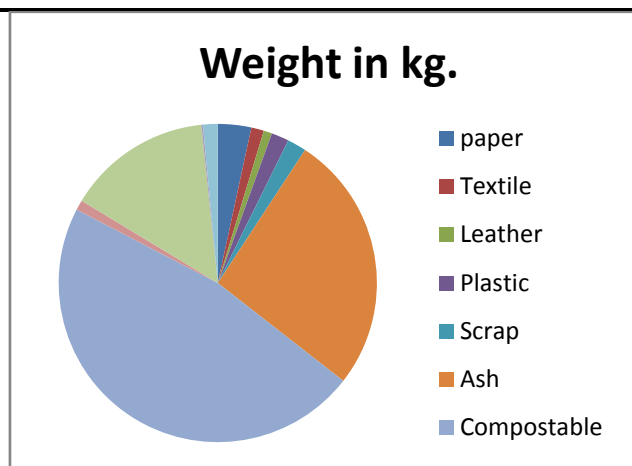
Sr. no	Address of the village	Population	VSW management system Yes/No	Segregation system Yes/No	Content of the VSW material in kg.										
					Paper	Textile	Leather	Plastic	Scrap	Ash	Compost	Organic	Garbej	Medical	Rubber/Glass
01	A/P- BaxiHipparge Tal- south solapur	Less than 5000	No	No	10	-	-	03	-	200	100	-	20	-	-
02	A/P- Takali Tal- south solapur	Less than 5000	No	No	15	-	-	05	-	20	110	20	25	-	05
03	A/P- Doddi Tal- south solapur	Less than 5000	No	No	30	-	-	04	-	100	150	-	50	-	-
04	A/P-Gawade wadi Tal- south solapur	Less than 5000	No	No	10	-	-	02	-	70	150	-	100	-	-
05	A/P- Vadapur Tal- south solapur	Less than 5000	No	No	20	02	-	02	-	120	270	-	20	-	-
06	A/P- Anthroli Tal- south solapur	Less than 5000	No	No	02	05	-	-	20	200	250	-	15	-	-
07	A/P- Fatate wadi Tal- south solapur	Less than 5000	No	No	10	07	15	12	24	152	27	-	184	-	05
08	A/P- Tandulwadi Tal- south solapur	Less than 5000	No	No	10	-	-	02	-	100	500	10	50	-	10
09	A/P- Kangalgaon Tal- south solapur	Less than 5000	No	No	20	12	05	20	15	110	180	-	50	-	05
10	A/P-Shirval Tal- south solapur	Less than 5000	No	No	25	-	-	01	01	200	210	-	50	-	-
11	A/P- Hanmgaon Tal- south solapur	Less than 5000	No	No	02	-	-	01	01	117	200	02	100	-	50
12	A/P- Ule Tal- south solapur	Less than 5000	No	No	20	10	10	07	-	50	80	-	70	-	02
13	A/P- Ingalgi Tal- south solapur	Less than 5000	No	No	10	02	02	15	04	11	200	-	20	02	.05

Content of the VSW material in kg.

Textile	Leather	Plastic	Scrap	Ash	Composting	Organic	Garbej	Medical	Rubber/Glass
-	-	03	-	200	100	-	20	-	-
-	-	05	-	20	110	20	25	-	05
-	-	04	-	100	150	-	50	-	-
-	-	02	-	70	150	-	100	-	-
02	-	02	-	120	270	-	20	-	-
05	-	-	20	200	250	-	15	-	-
07	15	12	24	152	27	-	184	-	05
-	-	02	-	100	500	10	50	-	10
12	05	20	15	110	180	-	50	-	05
-	-	01	01	200	210	-	50	-	-
-	-	01	01	117	200	02	100	-	50
10	10	07	-	50	80	-	70	-	02
02	02	15	04	11	200	-	20	02	.05
10	02	10	06	70	110	-	100	-	02
10	05	10	10	70	115	-	20	-	10
03	-	02	-	140	200	-	20	-	-
03	-	02	-	70	117	-	30	-	-
25	10	10	05	25	50	05	50	05	05
05	02	05	10	55	118	-	20	-	10
-	-	01	-	70	20	-	30	-	-
01	-	01	02	80	100	-	20	-	01
02	01	05	03	60	130	-	25	-	05
02	01	05	05	40	70	05	10	02	10
-	-	10	-	65	115	-	30	-	-
15	05	05	05	20	50	02	50	02	05
-	10	05	25	70	90	-	30	02	10
01	-	01	10	10	20	-	40	-	01
-	-	01	10	10	20	25	30	-	01
01	02	10	10	50	200	-	20	01	02
01	02	02	05	50	150	-	20	01	-
-	-	-	10	20	20	25	10	-	01
-	02	03	-	78	105	-	17	-	02
-	02	02	-	65	95	-	17	-	-
-	-	03	-	73	85	-	32	-	01
Total									
120	80	167	181	2461	4407	95	1375	15	140

6.1 Graphical representation of village solid waste

VSW content	Weight in kg.
paper	317
Textile	120
Leather	80
Plastic	167
Scrap	181
Ash	2461
Compostable	4407
Organic	95
Garbej	1375
Medical Waste	15
Rubber/Glass	140
Total	9358



7. CONCLUSION:

The data collected is 80 to 90 % correct and useful for development of village solid waste treatment plant. As in detail contents and its characteristics information got in this data. i.e. wet waste and dry waste . so using this information we can develop two different treatment plant for dry and wet waste and create awareness in peoples about treatment. Major content of village solid

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waste is ash and compostable material. Compostable material consists of cattle waste and agricultural waste material. Paper, plastic and metal scrap is another content of this waste , these materials contaminants the compost so it is important to segregate it properly by developing segregation treatment plant.

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