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Experimental Analysis of Solid Organic Waste with Composting Methods

Rohit Gupta[1] and Mr. Lalit verma[2]

[1]Research Scholar, M Tech (Energy Technology), Aditya College of Technology and Science, Satna (M. P.),485001, India

[2]Assistant Professor, Department of Mechanical Engineering, Aditya College of Technology and Science, Satna (M. P.),485001, India

ABSTRACT

The environmental component of urban solid waste and its proper disposal has become a major challenge worldwide. Environmental pollution, public health hazards and waste loss are the consequences of improper disposal. Recovery of the combined energy associated with organic waste, as well as waste reduction, can be achieved by using anaerobic digestion. The chemical composition of the substrate plays an important role in the factors responsible for digestion performance and cumulative methane production. Substrate processing to improve digestive performance has gained momentum in recent years. The amount of waste from mining and related industries continues to add to the problem. This study showed the availability of thermophilic phases at different temperatures. The highest temperature reported during operation is 66 °C. The ambient temperature and plant residue during the composting process were set at 41 °C and 66 °C, respectively.

Key Word: Organic solid waste; Composting process; Energy.

1. INTRODUCTION

The amount of waste continues to compound the problem in mining and related industries. Unfortunately, waste is produced by the processes of mining coal or steel in the mining and steel industries through the production of steel, the production of products widely seen as an inevitable product of economic waste from inefficient production processes, poor durability of goods and abuse patterns. . The creation of waste represents a loss of material and energy and imposes economic and environmental costs on society through its collection, treatment and disposal. The impact of waste on the environment, resources and human health depends on the quantity and the environment. Waste generation and disposal includes emissions (including greenhouse gases), water and soil, all of which can impact human health and the environment.

Waste management is becoming increasingly important due to environmental hazards and the depletion of all mineral resources. Given the large amount of waste in the mining industry, its use is a challenge to the environment and our natural resources. Therefore, it is necessary to recycle, reuse waste and reduce the impact of waste on the environment at the same time. Waste from mining or mining operations (eg, waste from mining and mineral processing) is a major source of waste in the world. They include materials that must be removed to access mineral resources, such as topsoil, topsoil, and outcrops, as well as debris left after the mineral has been largely depleted.

High moisture in organic waste leads to leachate production. Vegetable waste is a type of solid urban waste with high moisture content (88-94%) and is therefore harmful to the environment. Composting is an effective technology for treating these natural wastes. A comprehensive evaluation of the continuous testing activity has kept the environment free of CO hazards and CO2 emissions. This waste-derived solids additive has been shown to improve the engineering properties of portable soft clays and expanded clays, concrete and asphalt. Biopiles, another form of solid waste, have been developed as a good method of detoxification for use in wastewater treatment. It has been shown that the recycling and reuse of solid waste is essential to achieving the development of an environmentally friendly, environmentally friendly and sustainable infrastructure around the world. Vegetable, fruit and horticultural waste (VFG) is collected separately and composted. We studied the effects of the combined use of three different doses of VFG fertilizer and cattle manure in 7 years on the production of dry matter for the production of corn and three groups of soil animals: nematodes, microarthropods (springtails and worms) and earthworms including the application of VFG manure and manure gave high yield [1-3].

All applications of X-ray nanotechnology for use as additives or fillers in stabilizing or repairing weak engineering soils and as additives or fillers in concrete production are reviewed to provide new guidance and direction to geotechnical engineers in this field. AND. features. Solid waste management is one of the environmental problems facing Nigeria as a third world country. It is between abandonment and indiscriminate treatment by competent bodies [4]. This study examines compost production from anaerobically dehydrated stabilized primary sewage (DASPSS) and sawdust (SWD). SWD is added to increase the humic content of the final product. DASPSS is mixed with clinoptilolite (Cli), used as bulking agent, at 20% w/w, and the mixture is mixed with sawdust at 10%, 30% and 40% (w/w). Although the on-site waste sampling was relatively real, the representativeness of the samples is still questionable due to the uneven distribution of household waste and the randomness of the samples. In addition, it was often necessary to separate the samples obtained in the field to determine their composition [5]. The environmental component of urban solid waste and its proper disposal is becoming a major challenge worldwide. Environmental pollution, public health hazards and waste shortages are the consequences of improper disposal. Energy recovery associated with organic waste can be achieved by reducing the waste using anaerobic digestion [8]. The level of municipal waste is constantly increasing due to the rapid increase in urban population and technological development. The collection and disposal of municipal solid waste (MSW) creates major environmental problems, making its management one of the biggest challenges facing the world.

The environmental, cultural, social, economic and political conditions of each community have a major influence on municipal efforts and decision-making in household waste management. Home composting can be used as a solid waste management method, treating waste at source, thus increasing its recycling. And vermicomposting is a viable and fully effective method at the home level, as long as family members accept dealing with parasites and subsequent deworming [6]. It avoids the need to transport waste and the bio-modified material can be recycled locally as a soil conditioner. Generally, distributed fertilization systems require a long time (3 months or more) to stabilize the waste. In addition, odor problems have been reported as a major problem due to inadequate ventilation and insufficient aeration in the composting system to create anaerobic conditions. Therefore, research was planned to develop a domestic community bin with natural ventilation, which can produce good FW compost in a short time. The rapid growth of solid waste is a global challenge and organic waste is an important part of it. Composting is an efficient and effective way to turn solid waste into compost that can be returned to the farm and reduce pollution. But until now, composting of organic solid waste has not been widely used [7]. The field-scale performance of three pile systems was studied and compared for the composting of organic fractions selected from municipal solid waste (SWW): pile (TP), aerated static pile (SAP) and forced air. Running stack (SAP) Tap). Standard parameters such as temperature, oxygen content, moisture and porosity were monitored. The temperature was higher in the forced air system, while the oxygen content was higher in the forced air system. Improper waste management is dangerous to human health. In addition to being bad, it causes air pollution, affects water sources when it is dumped into the water, and destroys the ozone layer when it heats up, which increases the effects of climate change. Waste is often managed improperly using conventional methods. Composting has become a better way to treat organic waste to obtain a clean and stable final product that can be used as a natural ingredient. Composting is one of the few technologies that can be used at almost any scale, from home composting to large municipal wastewater treatment plants [8].

2. PROCEDURES

Samples (200 g per sample) were collected from the center and both ends (top, middle and bottom) of each respondent. After that, each sample was divided into two parts. As part of the dry horse, the soil passes through a 112 micron soil filter and is placed on a removable table. Oven-dried samples were used to determine physical composition, pH, conductivity (EC), particle size, solid content (SV) and organic carbon. The compost mixture was prepared by mixing vegetables (20 kg), cow dung (10 kg) and salt (2 kg) in a ratio of 6:3:1, making a total weight of 32 kg. A total of 10% of the selected dried citrus fruits to be found in the area weighing 32 kg in combination. After the raw material was fed into the rotary drum composter, the composting process was carried out for 20 days at room temperature. The drum was manually rotated to introduce air and agitate the raw material.

Thermal properties, such as the heat storage capacity or the given temperature of many materials, often affect the amount of material needed to maintain the proper temperature. The thermal energy component is also a function of moisture content. As expected, an increase in ash content was observed with a decrease in VS content. An increase in the content of direct ash affects a certain increase in temperature during the composting process. Furthermore, in the present study, a 24% increase was observed in the constant temperature range during the thermophilic phase. The temperatures in the upper, middle and lower parts of the compost mixtures in the rotating drums were monitored using a digital thermometer with a temperature sensor attached to it. Temperature data were collected daily every 4 hours during the composting process, and three readings were calculated for each compost mixture. The ambient temperature was also recorded using the same temperature sensor. Moisture content was determined gravimetrically by drying the samples at 110 °C in a hot air oven for 24 hours. Volatile solids content (weight loss on ignition at 550 °C) is determined using a muffle.

3 RESULTS AND DISCUSSION

A good composting process requires that temperature, oxygen and moisture levels are maintained uniformly throughout the compost matrix. There are two distinct phases in the fertilization process: the active stabilization phase and the maturation period. In this study, both stages are performed in a rotating drum, adjusting the air through the rotation process. Regarding the composting process, the important function of rotation is to aerate the material, provide oxygen and release heat and gaseous products of decomposition. The moisture-modified composite material is placed in a rotating drum to ferment.

We have conducted experiments and analyzed the results of combinations of vegetables, as well as analyzes of combinations of vegetables mixed with bulking agents. The results of various tests conducted during the process are listed below.

Table 1 Vegetable wastes based heat generation

Sl. No.	Days	Ambient Temperature (°C)	Vegetable Wastes Temperature (°C)
1	1	37	40
2	2	38	32
3	3	40	44
4	4	41	48
5	5	42	49
6	6	48	56
7	7	43	46

8	8	40	43
9	9	38	41
10	10	36	40

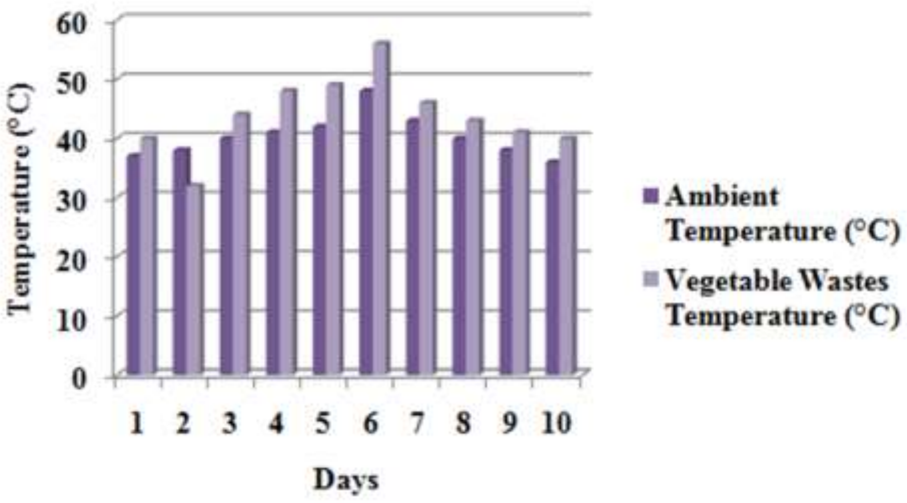

Figure 1 Vegetable wastes based heat generation

Table 1 and figure 1 show the result of combining plant waste without accumulation. Initially, the room temperature was 38°C and after composting it was set at 48°C. The temperature of the vegetable remains reached a maximum level on the sixth day, its surrounding temperature was high.

Table 2 Heat-based vegetable waste is used to compost food waste mixed with different compost materials (wheat straw, fresh grass and wood).

Sl. No.	Days	Ambient Temperature (°C)	Vegetable Wastes Temperature (°C)
1	1	40	41
2	2	41	42
3	3	42	46
4	4	43	59
5	5	44	66
6	6	48	53
7	7	43	48
8	8	39	47
9	9	38	46
10	10	37	44

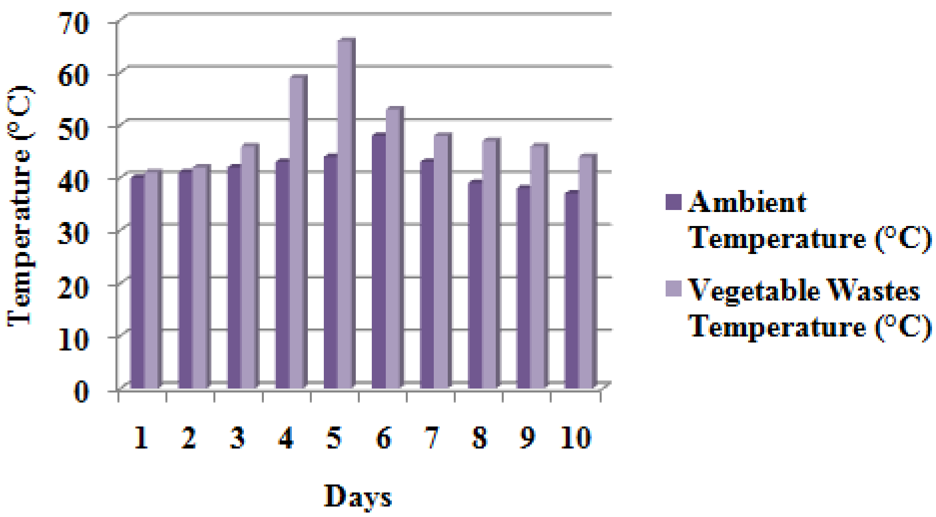

Figure 2 Heat-based vegetable waste is used to compost food waste mixed with different compost materials (wheat straw, fresh grass and wood).

Table 2 and Figure 2 show that heat-based vegetable waste is used to compost food waste mixed with different composting ingredients (wheat grass, new grass and wood) within ten days, after which it is found that the ambient temperature has a small range. value. (40 °C) on the first and sixth day, the highest value (48 °C) on the fifth day and the lowest value (48 °C) on the tenth day, the highest value (66 °C) on the fifth day.

Moisture content is very important in composting and can be a limiting factor if not taken care of. Excess water prevents access to oxygen, while lack of water prevents the diffusion of soluble molecules and bacterial activity, reducing the rate of fertilization. A moisture content of 40 to 60 percent is considered optimal for making good compost. Although a wet mixture is necessary to maintain the organic decomposition that is essential in the composting process, dry compost is easy to handle and store without much hassle.

Only after composting is completed can drying be considered a necessary condition for storage or sale. In aerobic composting, high humidity should be avoided because water removes the air from between the particles and causes anaerobic conditions. On the other hand, too low humidity deprives organisms of the water they need to function and inhibits their activity. Excess moisture after the final stage of decomposition can have a number of negative effects on subsequent processes.

Water content plays an important role in composting as the decomposition of organic matter depends on it. In this composting process, the main material was produced by chopping food scraps with a chopper. In the composting process, high water content causes anaerobic conditions, as the pores are filled with water rather than air, limiting the availability of oxygen. Because food waste has a high water content, it is necessary to add bulking agents, which in this case was compost.

Table 3 Vegetable wastes based on moisture content and volatile solids using food waste composting mixed with different composting materials (wheat straw, grass straw and wood)

Sl. No.	**Days**	**Moisture content (%)**	**Volatile solids (%)**
1	1	72	82
2	2	68	74
3	3	62	71
4	4	65	71
5	5	59	70
6	6	58	73
7	7	53	70
8	8	55	68
9	9	53	65
10	10	49	65

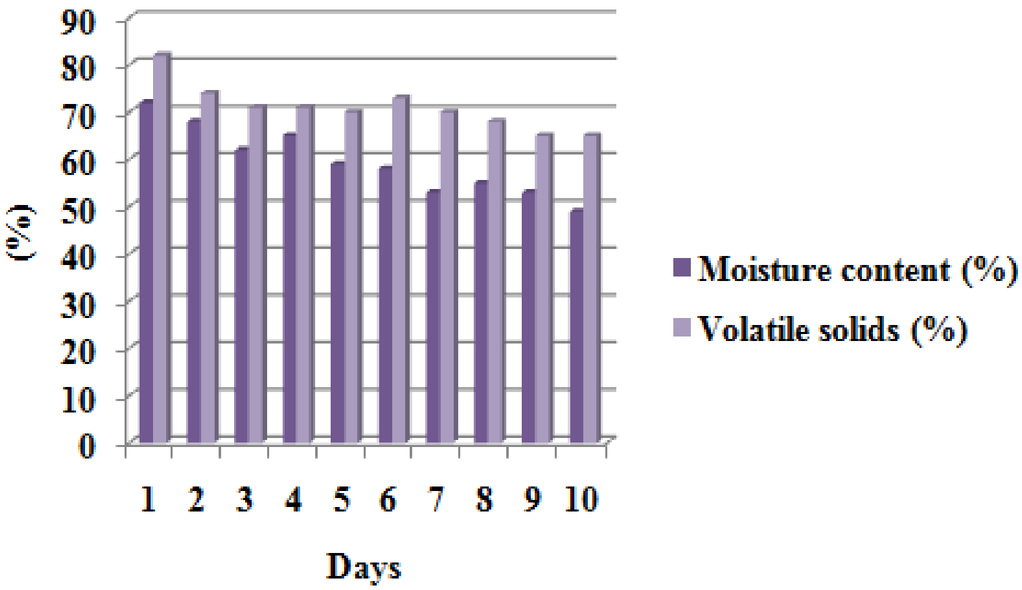

Figure 3 Vegetable wastes based on moisture content and volatile solids using food waste composting mixed with different composting materials (wheat straw, grass straw and wood)

Table 3 and figure 3 show vegetable waste on the basis of moisture and volatile solids using food waste mixed with different composting materials (wheat straw, hay and straw) during ten days. The variable strength has a range from a low value (49%) with a high value of 10 days (72%) on day 1 and a low value (65%) on day 10 and a high value (82%) on day 4.

Table 4 Vegetable wastes based on moisture content and volatile solids using food waste composting mixed with different composting materials (wheat straw, hay and wood shavings)

Sl. No.	**Days**	**Moisture content (%)**	**Volatile solids (%)**
1	1	72	79
2	2	68	77
3	3	69	78
4	4	61	75
5	5	60	74
6	6	73	82
7	7	73	82
8	8	73	82
9	9	54	67
10	10	48	62

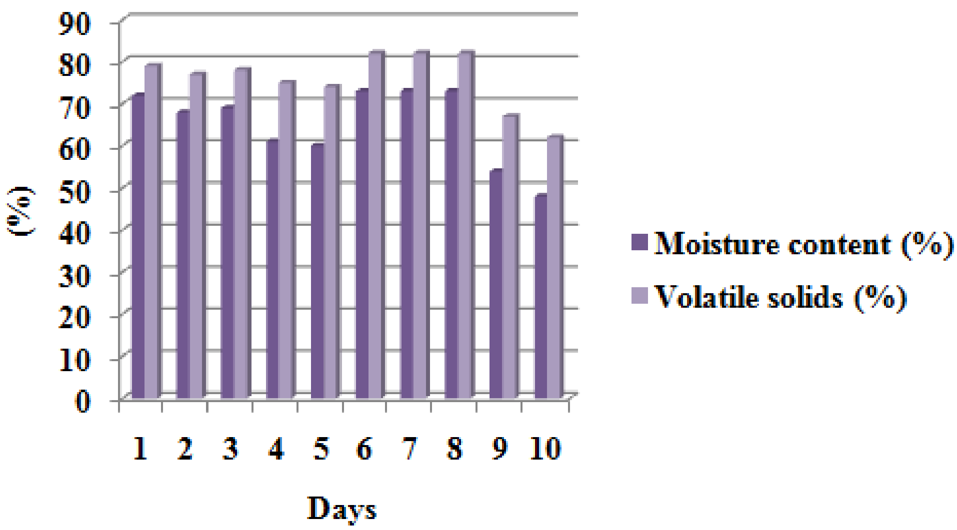

Figure 4 Vegetable wastes based on moisture content and volatile solids using food waste composting mixed with different composting materials (wheat straw, hay and wood shavings)

Table 4 and Figure 4 show the composting of vegetable waste during ten days using mixed food waste with different composting ingredients (wheat straw, grass straw, grass straw and wood) due to moisture content and volatile solids, after which it is found that the moisture has a range of values the lowest (48%) on day 10 the highest value (73%) on day 6 to 8 and the variable solid has a range of lowest value (62%) on day 10 highest value (82%) on day 6 to 8.

4. CONCLUSIONS

The results of the present study showed the scope of the Additive Aided Composting Process. It also suggested that drum compost is a convenient and simple method of composting. Many small and medium-sized drums can be installed in different waste generation areas such as suburban areas of big cities, institutions, vegetable markets and large dairies. The results showed that the incorporation of multiple agents and vegetable waste mixture into the composting process was a successful effort. The results obtained are considered preliminary results and further studies are still needed to clarify the effect of various parameters and process adjustments and its final product using this reactive action. The following are the results that can be concluded from this study.

Emission of non-polluting residues of (H2). Table 2 and Figure 2 show that heat-based vegetable waste is used to compost food waste mixed with different composting ingredients (wheat grass, new grass and wood) within ten days, after which it is found that the ambient temperature has a small range. value. (40 °C) on the first and sixth day, the highest value (48 °C) on the fifth day and the lowest value (48 °C) on the tenth day, the highest value (66 °C) on the fifth day. Table 4 and Figure 4 show the composting of vegetable waste during ten days using mixed food waste with different composting ingredients (wheat straw, grass straw, grass straw and wood) due to moisture content and volatile solids, after which it is found that the moisture has a range of values the lowest (48%) on day 10 the highest value (73%) on day 6 to 8 and the variable solid has a range of lowest value (62%) on day 10 highest value (82%) on day 6 to 8.

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