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A Review of the Solid Organic Waste with Composting Methods by Experimental Approach and Analysis

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Abstract
The organic fraction of municipal solid waste and its proper disposal has become a serious challenge all over the world. Environmental pollution, public health risks, and scarcity of dumping are the consequences of improper disposal. The recovery of embodied energy associated with organic waste along with waste reduction can be achieved using anaerobic digestion. The chemical composition of the substrate plays a crucial role among the factors responsible for the performance of digestion and the cumulative production of methane. Substrate processing to improve digestion performance is gaining momentum in recent years. The amount of waste continues to exacerbate the problem in mines and related industries. Unfortunately, waste is produced by mining processes of coal or steel from the mining and steel industries through steel production, the production of products widely seen as an inevitable product of economic waste from inefficient production processes, poor durability of goods and patterns of abuse.

Key Word- Energy, municipal solid waste, prediction.

1. Introduction

The amount of waste continues to exacerbate the problem in mines and related industries. Unfortunately, waste is produced by mining processes of coal or steel from the mining and steel industries through steel production, the production of products widely seen as an inevitable product of economic waste from inefficient production processes, poor durability of goods and patterns of abuse. Waste formation reflects loss of property 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 quantity and the environment. Waste production and emissions include emissions (including greenhouse gases), water and soil, all of which can have an impact on human health and the environment.

Figure 1 Industries wastes

Waste management is becoming increasingly important due to environmental risks and 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. So there is a need at the same time to recycle, make use of waste products and reduce the impact of waste on the environment. Waste from mines or mining activities (eg waste from mining and mineral processing) is one of the major sources of waste in the world. They include materials that must be removed to access mineral resources, such as topsoil, topsoil, and rocky outcrops, as well as debris left after the mineral has been severely depleted.

Figure 2 Waste management

Waste mining in mineral exploration and removal creates challenges for many local residents. Mining and refining can cause environmental problems, including acid refining in mines, soil erosion and erosion, chemical release, dust metamorphosis, habitat degradation, and surface and groundwater pollution and depletion.

2. Literature review

The novelty of this research project is to study the differences in the physical composition or body parameters of the compost when digging the container. Therefore, the objective of this study was to elucidate: (1) how the combination of collection agents and pollinators affects composting during plant manure application; (2) how this application contributes to the chemical and nutritional quality of the final compost; and (3) what is the relationship between the various physical boundaries.

High moisture content in organic waste leads to leachate production. Vegetable waste is a type of municipal solid organic waste that has a high moisture content (88-94%) and is thus harmful to the environment. Composting is a viable technology for treating such organic wastes [1]. The overall assessment of the current assessment work has kept the environment free from the risks of CO and CO2 emissions. This additional cementing material derived from solid waste was shown to improve the engineering properties of treated soft clays and expansive clays, concrete and asphalt. Biopiles, another form of solid waste, has been established as a good detoxifier for use in wastewater treatment. It has been shown that recycling and reuse of solid waste is central to achieving environmentally friendly, environmentally friendly and sustainable infrastructure development globally [2]. Vegetable, fruit and horticultural (VFG) waste is collected separately and composted. We studied the effects of combined application of three different doses of VFG fertilizer and cattle slurry over 7 years on dry matter production of maize and three groups of soil animals: nematodes, microarthropods (springtails and mites) and earthworms Combined application of VFG compost and slurry gave the highest yield [3].

Synthesis of local nano-sized ash material from local waste incinerated and fully pulverized. All applications of X-ray nanotechnology for use as admixtures or fillers in the stabilization or modification of weak engineering soils and as admixtures or fillers in concrete production are reviewed to give a hint and new direction to geotechnical engineers in this field. Is. aspects [4]. Solid waste management is one of the environmental problems facing Nigeria as a third world country. It is between indiscriminate disposal and management by the concerned agencies [5]. This study considers the production of compost from dehydrated anaerobically stabilized primary sewage sludge (DASPSS) and sawdust (SWD). SWD is added to increase the humic substances in the final product. DASPSS is mixed with clinoptilolite (Cli), used as a bulking agent, at 20% w/w, and the mixture is mixed with sawdust at 10%, 30%, and 40% (w/w) is performed on The final results indicated that by increasing the concentration of sawdust in the initial mixture, the humic substances in the final product also increased [6].

Although the on-site waste samples were relatively real, the representativeness of the samples is still questionable due to uneven distribution of household waste and randomness of sampling. In addition, it was often necessary to separate samples obtained in the field to determine their composition [7]. The organic fraction of municipal solid waste and its proper disposal is becoming a serious challenge worldwide. Environmental pollution, public health hazards and shortage of dumping grounds are the consequences of its improper disposal. Energy recovery associated with organic waste can be achieved with waste reduction using anaerobic digestion [8]. The rate of municipal solid waste is continuously increasing due to the rapid increase in urban population and technological advancement. The collection and disposal of municipal solid waste (MSW) causes serious environmental problems, making its management one of the major challenges facing the world [9].

Environmental, cultural, social, economic and political conditions of each community greatly influence municipal efforts and decision-making in household waste management. Home composting can be used as a solid method of SWM, handling waste at source thus increasing its recyclability. And vermicomposting is a viable and fully viable option at the household level, provided family members are receptive to dealing with vermin and subsequent deworming [10]. Avoids the need for waste transportation and the bio-modified material can be recycled locally as a soil conditioner. Generally, decentralized composting systems require long periods (3 months or more) for waste stabilization. Additionally, odor problems have been reported as a major problem because of insufficient diversion and inadequate ventilation in the composting system to create anaerobic conditions. Therefore, a research study was planned to develop a naturally ventilated domestic community drum, which can produce good quality compost from FW in a short period of time [11]. Rapid growth of solid waste is a global challenge and organic waste is a major part of it. Composting is an efficient and effective method of converting solid organic waste into compost, which can be returned to agricultural land as well as reduce pollution. But so far, composting of solid organic waste has not been widely used [12]. The field-scale performance of three pile composting systems was studied and compared in composting the organic fraction selected by municipal solid waste (OFMSW): pile (TP), static forced aerated pile (SAP) and forced air. Running Stack (SAP) Tap). Regular parameters like temperature, oxygen content, humidity and porosity were monitored. The temperature was found to be higher in the forced-air system while the oxygen content was higher in the forced-air system [13].
Improper waste management is harmful to human health. Besides being unsightly, it causes air pollution, affects water bodies when dumped into water, as well as destroys the ozone layer when burned, adding to the

effects of climate change. Waste is often managed improperly using conventional methods [14]. Composting has become a better option for treating organic waste to obtain a final stable clean product that can be used as an organic amendment. Composting is one of the few technologies that can be implemented at virtually any scale, from home composting to large municipal wastewater treatment plants [15].

3. Environmental impacts of treatment

Besides energy balance and technical and economic investigation, environmental aspects, such as pathogen expulsion, use of chemicals, potential for manageable use of sediments and effects on human health must be considered during the selection of the treatment process. Life Cycle Assessments (LCA) will help assess the efficiency and environmental impact of the AD process. Few researchers have evaluated the environmental impacts of using pre-AD treatment techniques for solid waste. It has conducted a life cycle assessment to assess the environmental attributes associated with the use of seven treatment technologies (alkaline, acidic, thermal, thermoacid, thaw, pressurized, and ozone) for kitchen waste and sewage sludge. Effects were analyzed in relation to abiotic resource depletion potential, eutrophication, global warming, human toxicity, and terrestrial environmental toxicity. The researchers suggested that chemical processing, pressure, and compression techniques outperform ozone, freezing, thawing, and thermal strategies through minimal adverse environmental impact.

4. Benefits of Waste Management

1. Acquisition of additional immature items through service acquisition.
2. Mineral expansion.
3. Development of a useful product from recycled materials.
4. Reduce pollution and balance the environment.
5. Source of additional income.
6. Employment of people in small scale waste management industries.

5. Conclusions

Humidity is accurately determined by freezing the samples at 70 °C using a hot air oven for 24 hours. A 40 liter metal container was used for measuring. The measurement was performed in three stages. In the first stage the container is filled up to 1/3 height and then attached to a flat surface to ensure that the gaps are filled, in the second stage the container is filled up to 2/3 followed by squeezing the empty space, and the last section is filled at the upper edge of the vessel. Most treatment techniques have been extensively evaluated to assess the potential of biogas. However, very limited reports are available illustrating the biomethane process on an experimental scale using newly developed methods and techniques. Many scientific modifications must be encountered when translating lab scale experiments into large/industrial operations. Physical, thermal, compound, organic or chemical that has been extensively tested on a laboratory scale under specific conditions

References

[1] M. S. Jain, M. Daga, and A. S. Kalamdhad, 'Variation in the key indicators during composting of municipal solid organic wastes', *Sustain. Environ. Res.*, vol. 1, no. 1, pp. 1–8, 2019.

[2] K. C. Onyelowe *et al.*, 'Recycling and reuse of solid wastes; a hub for ecofriendly, ecoefficient and sustainable soil, concrete, wastewater and pavement reengineering', *Int. J. Low-Carbon Technol.*, vol. 14, no. 3, pp. 440–451, 2019.

[3] B. L. M. M. Leroy, L. Bommele, D. Reheul, M. Moens, and S. De Neve, 'The application of vegetable, fruit and garden waste (VFG) compost in addition to cattle slurry in a silage maize monoculture: Effects on soil fauna and yield', *Eur. J. Soil Biol.*, vol. 43, no. 2, pp. 91–100, 2007.

[4] O. KC, 'Solid Wastes Management (SWM) in Nigeria and their Utilization in the Environmental Geotechnics as an Entrepreneurial Service Innovation (ESI) for Sustainable Development', *Int. J. Waste Resour.*, vol. 07, no. 02, pp. 2–5, 2017.

[5] A. A. Zorpas and M. Loizidou, 'Sawdust and natural zeolite as a bulking agent for improving quality of a composting product from anaerobically stabilized sewage sludge', *Bioresour. Technol.*, vol. 99, no. 16, pp. 7545–7552, 2008.

[6] G. Zeng, J. Ma, D. Hu, and J. Wang, 'Experimental Study on Compression and Intrinsic Permeability Characteristics of Municipal Solid Waste', *Adv. Civ. Eng.*, vol. 2019, 2019.

[7] K. Paritosh *et al.*, 'Organic fraction of municipal solid waste: Overview of treatment methodologies to enhance anaerobic biodegradability', *Front. Energy Res.*, vol. 6, no. August, pp. 1–17, 2018.

[8] I. Boumanchar *et al.*, 'Municipal solid waste higher heating value prediction from ultimate analysis using multiple regression and genetic programming techniques', *Waste Manag. Res.*, vol. 37, no. 6, pp. 578–589, 2019.

[9] P. R. Kumar, A. Jayaram, and R. K. Somashekar, 'Assessment of the performance of different compost models to manage urban household organic solid wastes', *Clean Technol. Environ. Policy*, vol. 11, no. 4, pp. 473–484, 2009.

[10] M. K. Manu, R. Kumar, and A. Garg, 'Performance assessment of improved composting system for food waste with varying aeration and use of microbial inoculum', *Bioresour. Technol.*, vol. 234, no. October, pp. 167–177, 2017.

[11] T. Chen, S. Zhang, and Z. Yuan, 'Adoption of solid organic waste composting products: A critical review', *J. Clean. Prod.*, vol. 272, p. 122712, 2020.

[12] L. Ruggieri, T. Gea, M. Mompeó, T. Sayara, and A. Sánchez, 'Performance of different systems for the composting of the source-selected organic fraction of municipal solid waste', *Biosyst. Eng.*, vol. 101, no. 1, pp. 78–86, 2008.

[13] M. S. Ayilara, O. S. Olanrewaju, O. O. Babalola, and O. Odeyemi, 'Waste management through composting: Challenges and potentials', *Sustain.*, vol. 12, no. 11, pp. 1–23, 2020.

[14] T. Sayara, R. Basheer-Salimia, F. Hawamde, and A. Sánchez, 'Recycling of organic wastes through composting: Process performance and compost application in agriculture', *Agronomy*, vol. 10, no. 11, 2020.