



Stabilization of Municipal Solid Waste by Additives

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ABSTRACT

This paper examined the variability which occurs in key parameter like PH, temperature, moisture content, organic carbon, nitrogen, phosphorus, odour, color etc. During the 30 days regular monitoring of composting process 5 kg of municipal solid waste, old compost straw and soil, 5%, 10%, 15%, of gomutra and neem leaves of 3kg municipal solid waste for composting was done by using 16th buckets model composter made up with proper aeration and drainage and was kept in semi sun rays condition. PH ranging 7.6 to 8.9 in the first phase, temperature rise from the first day of process and become 55°C on 18 days. Moisture content in compost was unstable through out the process due to changing microbial process population. The NPK content of final compost are find out. After finding the result of NPK obtains form composting treatment given to MSW and gomutra are indicated that combined composting are an attractive method for management of municipal solid waste.

Key words: Municipal Solid Waste, Goumitra, (Cow urine), neem leaves, Composting, key parameter.

INTRODUCTION

Due to increasing population as well as industrial and economic development, the output of the municipal solid waste (MSW) has been increasing in India. On the other hand, sanitation landfill would occupy a lot lands and lead to two steps solution by less developed technology. Solid waste management is considered to be one of the most serious environmental problems confronting urban areas in developing countries.

Composting of MSW reduces the volume of the wastes, germination of weeds in agricultural fields and destroys malodorous compounds. In adequate collection and uncontrolled disposal of solid waste results in a serious threat to the inhabitants as well as an environment. Municipal solid waste and its management is a big concern for India these days. Municipal solid waste management is taken as one of the burning issue. Among solid waste, more than 80% is organic hence effective composting can be the best option for its management. Cow urine (Gomutra) has high nitrogenous fertileuplizer value than cow dung and neem leaves has high nitrogen, potasse, phosphate which is to improve growth of plants. Nutrient value of urine can be trapped through organic Composting. Neem as potential fertilizer as well as pesticides. So that the neem leaf composted worked effectively both as fertilizer as well as pesticides. That's why; neemleaves has also been used to enrich the soil. Together, they are widely used in India to fertilize cash crops. Urine applied compost accelerated the Composting process as well as enhanced the quality of the compost. Despite the fertilizer value of cow dung, it has several challenges to replace chemical fertilizers in the farm land. Urea in cow urine degrades rapidly to the gases NH₃ and CO₂. Cow urine is too strong to apply directly in the field and should be diluted in order to apply directly in the plants.

Cow urine is in liquid form and thus is not easy to transport it as of chemical fertilizer. Waste recovery such as recycling and composting is an option of reducing the waste amount to be disposed. Composting MSW is seen as a method of diverting organic waste materials from landfills, while creating a product, at relatively low cost that is suitable for agricultural purposes. Many studies have been carried out on assessing the effect of Gomutra in composting of municipal solid waste. Composting satisfied the health and aesthetic aspects of waste disposal by destroying almost all pathogens. In addition, the product becomes having agricultural and horticultural benefits as a soil conditioner and fertilizer. municipal solid waste management (MSWM), a critical element towards sustainable metropolitan development, include segregation, storage, collection, relocation, carriage, processing, and disposal of solid waste to minimize its adverse impact on environment. Unmanaged MSW becomes a factor for publicity of countless disease. In the improved countries, solid waste management (SWM) belongs to important thrust areas for ensue research and economic and technological development have initiated irritability of stock holder to it.



Fig. 1 Municipal Solid Waste

MUNICIPAL SOLID WASTE (MSW)

Term municipal solid waste (MSW) is normally assumed to include all of the waste generated in a community, with the exception of waste generated by municipal services, treatment plants, an industrial and agricultural processes. In the urban context the term municipal solid waste is of special importance. The term refers to all waste collected and controlled by the municipality and comprises of most diverse categories of waste. It comprises of waste from several different sources such as domestic waste, commercial waste, institutional waste and building materials waste.

COMPOSTING

Composting is defined as a microbe's best, aerobic, solid phase matrix, self heating process. The matrix consists of the organic material which serves as a source of nutrients for microbial growth, a sink for metabolic products, a site for gas exchange, and thermal insulations. Owing to the insulating property of the material, heat generated metabolically is conserved within the system thereby elevating the matrix temperature from an ambient mesophilic starting point into the mesophilic range. As readily metabolized substances become depleted, temperatures decline and eventually return to ambient levels.

a) About additives:

We used Gomutra (cow urine) and Neem leaves as additives. In a cow best economy, dung and urine are the measures resource of the cow economy, next only two bullock energy. Given these, that a simple resource like cow urine can have such (curative powers is unimaginable. Regarding the benefits of cow urine showcases its multiple uses. the cow's uses in dairying and agricultural purposes such as ploughing, transportation, manure and pest repellents are well known. Dried cow dung (Gober) is used prolifically in rural India as fuel for fire and a power resources. Environment friendly gobergas plants across rural India will health save the ozone layer and prevent globe warming. Neem leaves passes anti microbial, incepticedal and nitrification in hibitory biochemical s that may influence compost stability. However, if neem bested compost achieves stability. It can prove is useful by providing fertilizer cum pesticides properties.

Composition of Cows Urine and Neemleaves:

Water 90%, Urea 2.5%, Minerals, Hormones, Salts & Enzymes 2.5%. Proteins 7.1 %, Carbohydrates 22.9 %, Minerals, Calcium, Phosphorous, Vitamin C, Carotene etc.

b) Problems statement:

Many urban farmers are continuously cultivating on pieces of land year after year which is observed to have lost its nutrients resulting in poor or low yields of crops. It is therefore anticipated that the use of decomposed organic waste will boost production. Much of the decomposed solid waste consists of organic matter that can fertilize crops or can be recycled into a profitable input (Compost) for urban agriculture. Urban farmers using decomposed solid waste in the Tamale city have attested to the benefit of better soil structure. However, the manner in which solid waste is disposed from home affects their ability to efficiently use decomposed solid waste for fertilizing their crops. They cite an example of the way urban dwellers mix all kinds of waste without segregating waste especially, those of organic waste from the non-organic waste as noted.

PROJECT OBJECTIVES

- To study the effect of additives on municipal solid waste (MSW).
- To study the changes in waste characteristics with respect to time.
- To study the different types of additives or enzymes used in MSW for quality with respect to time.
- To study the results of different parameters.
- To study the stabilization process of municipal solid waste.

LITERATURE SURVEY**1. Rongxi Wu, Colorado State University (2017):**

Due to animal production waste increases in Colorado, anaerobic digestion has become increasingly considered as a technology to convert organic solid waste into renewable energy. The arid climate with water resource limitations in Colorado result in high solid cattle manure production, containing between 50% to 90% total solid.

2. J. Barthod, C. Rumpel & M. F. Dignac (2018):

Composting and Vermicomposting are sustainable strategies to transform organic waste into organic amendments, valuable as potting media or soil conditioner. The negative aspects can be limited through the addition of organic, inorganic or biological additives to the composted or vermicomposted mixture. Ultimately, region specific transformation processes should be designed depending on the availability of organic waste and additives taking into consideration the availability of organic waste and additives as well as prevailing pedoclimatic conditions.

3. M. Rastogi, M Nandal & L Nain (2019):

Work aimed to investigate the effect of cow dung and cellulolytic/humic characteristics during MSW Composting. In the study, bioaugmentation (bacterial consortia and cow dung slurry) to MSW composting facilities early maturity compared to other inoculated treatments. The results substantiate the effect of temperature on the humification rate of composting.

4. Mansi Rastogi, Minakshi Nandal & Babita Khosla (2020):

The degradation and stabilization of organic matter present in waste. The use of microbial additives during Composting is considered highly efficient, likely to enhance the production of different enzymes resulting in a better rate of waste degradation. Compost quality is essentially computed to confirm non-toxicity of compost towards plant growth.

5. V. Mironov, A. Vanteeva, D. Sokolova, A. Markel, Y. Nikolaev (2021):

Mechanical, Biological treatment of MSW facilitates reducing the landfill work load. The current research aimed to study general activity parameters, content, functions, and diversity of fungal and prokaryotic microbiota in mechanically separated organic fraction of MSW Composting without using bulking agents and process promoting additives. The biodiversity of the microbiota increased at the stages of cooling and maturation under conditions of relatively high nitrogen content. Thus, the microbial community and its succession during MSW Composting were characterized for the first time in this work.

METHODOLOGY

Collection of MSW



Collection of Additives [GOMUTRA (cowurine) & Neemleaves]



Fill the box 15 kg of MSW



Volume of MSW was mixed with additives for composting



To now the trends which occur in the composting process a regular monitoring of parameters for 30 days.

CONCLUSION

In conclusion showed that the combination of Municipal Solid Waste and 10% of gomutra and neem leaves was effective and gomutra tends to accelerate the composting process. Reduction of waste by recycling at an affordable cost with locally available resources was a practical approach for waste management and environmental protection.

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