

Experimental Analysis of Organic Food Waste for Degradation by Ayurvedic Herbal Plants and Medicines

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Abstract: Decomposing the refused waste & maximum possible degradation of Organic food waste from canteen of Institutes/organization & other sources would solve the later purpose. Due to increase in population, busy life schedules & haphazard living style of the people, there is drastic change in their food consumption style leading to a large quantity of waste left out. Now a day's practices are being done for solid waste degradation up to 20-25% using Chemicals. It is essential to decompose the waste before that it becomes necessary to degrade that waste to a larger scale using Ayurvedic herbals in proper, effective and economical way. The main objective of the present study was to degrade Organic food waste of canteen using Ayurvedic herbals or medicines. Also, the need of the proposed study is to reduce the volume of canteen waste up to maximum extent or to fully degrade it using herbal medicines which are available at low cost which makes the project cost effective. Other objectives includes determination of physical properties like moisture content, pH, specific gravity, specific weight and later on implementing the best results out on a large scale for decomposing. Such study was carried out in renowned Deemed University in Pune, India during 2015-16 to make campus Sustainable and Green. This study shall help administrators of University/Institutes/Organization to curb the problem of Solid Waste in their campus as well as to implement Technical Education Quality Improvement Program (TEQIP) phase III Environment Management Framework. Also, such study shall help Urban Planners and Environmental Planners to erect and commission Organic waste Degradation and Decomposition Units in and around India by using the technology of application of Ayurvedic Herbal Plants and Medicines which is available abundantly in India.

Keywords: Solid Waste, Organic Waste, Food Waste, Canteen, Ayurvedic, Herbal, Plants, Medicines, Decomposition

I. Introduction

Rapid industrialization and population explosion in India has led to the migration of people from villages to cities, which generate thousands of tons of Municipal Solid Waste (MSW) daily. The MSW amount is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020 (Sharma and Shah, 2005; CPCB, 2004; Shekdar et al., 1992). Poor collection and inadequate transportation are responsible for the accumulation of MSW at every nook and corner. The management of MSW is going through a critical phase, due to the unavailability of suitable facilities to treat and dispose of the larger amount of MSW generated daily in metropolitan cities (US EPA, 1999). Unscientific disposal causes an adverse impact on all components of the environment and human health (Rathi, et al. 2006, Sharholy, M., Ahmad, K., Mahmood, G., Trivedi, R. C., et al. 2005).

Ayurveda is the traditional healing modality of the Vedic culture from India. It is said to be 2000 to 5000 years old, meaning it has stood the test of time. Ayurveda is a Sanskrit word that literally translates as "the wisdom of life" or "the knowledge of longevity". In accordance with this definition, Ayurvedic medicine views health as much more than the absence of disease. The wise seers and sages of the time, intuitively understanding the physiology and workings of the mind-body-spirit long before the advents of modern medicine, explained the basic principles of Ayurveda.

One of the constituent of MSW is organic waste especially Food Waste from various canteens of organizations which is improperly handled in Indian Cities. Pune, being fastest and rapidly growing city in India is facing the problem of food waste dumped on roadsides and other important places of interest. Education institutes in Pune are growing and known for Educational Hub in India. College of Engineering, Pune under Bharati Vidyapeeth Deemed University is biggest in Pune and known for rich lifestyle of the students across India and abroad too. Daily 80 kg and more food waste are being generated from the canteen of this institute

alone. Hence, this study was undertaken with the objective of Degradation of food waste with the help of Ayurvedic Herbal Plants and Medicines instead of Chemical decomposition.

II. Materials And Methods

Physical properties like moisture content, pH, specific gravity, specific weight were determined for the analysis for implementation of decomposition on large scale. Proximate analysis consist of moisture content, ash content, volatile matter and fixed carbon determined by put the selected sample to different range of the temperature, between 100°C to 950°C. The laboratory methods to measuring the proximate analysis of samples in this research were carried out based on ASTM standard. This standard determine the condition of lab analysis such moisture and volatile content. The percent moisture of the MSW samples was determined by weighing 1 kg of the samples into a pre weighed dish and drying the samples in an oven at 105°C to a constant weight (ASTMD 3173). The percent moisture content (MC) was calculated as a percentage loss in weight before and after drying. The volatile matter content was determined by the method of ignition of the sample at 950°C. The triplicate samples of MSW material used in the moisture content determination were weighed and placed in a muffle furnace for 7 minutes at 950°C (ASTMD3175). After combustion, the samples were weighed to determine the ash dry weight, with volatile solids being the difference between the dried solids and the ash. Ash content of waste is the non-combustible residue left after waste is burnt, which is represents the natural substances after carbon, oxygen, sulfur and water. Analysis include of dried the samples at 750°C for 1 hour (ASTMD 3174). Fixed carbon defined by carbon found in the material which is left after volatile test. Fixed carbon is determined by removing the mass of volatile from the original mass of the sample.

Ayurvedic plants like Asafetida, Neem, Tulsi and Aloe vera were used for degradation of organic food waste. Asafetida is an ancient Indian culinary ingredient, loaded with immense health benefits. Its powder with buttermilk is a very famous Indian home remedy for bloating. It is called as Hingu in Sanskrit and also in many other languages. Neem is extensively used in Ayurvedic medicines and remedies since thousands of years. Its root bark, stem bark, gum, flower, leaves, seeds and seed oil are used for various medicinal purposes. Tulsi, Holy Basil – The plant with an auspicious name has medicinal usage extending from reducing ill effects of radiotherapy of cancer to maintaining Brahmacharya – Celibacy. The beauty of Aloe vera can be matched with the beauty of its health benefits. Aloe-vera benefits are not only limited to cosmetics.

III. Results And Discussion

PH of the sample of food waste was ranging between 4.9– 5.28 which is concluded to be acidic in nature due to presence of citric fruits. Moisture content in the sample of food waste was found out be 26.4%, Ash content was calculated to be 15.75 grams , Volatile matter was calculated to be 98.3% and Energy content was determined to be 4800 Btu.

Ayurvedic plants like Asafetida was used for degradation of the sample of 1 kg and seen to be not effective as degradation takes place in 20 and more days. Also, it requires more water for further decomposition and degradation. Similarly, application of Aloe-vera on food sample was not effective as sample had seen fungus and required more water for decomposition. Neem has shown very good effects on degradation of sample as degradation time counted was only 6 days with 90% degradation. Also, it requires less water and do not show any fungus or other microbial activity. Tulsi was, also, very effective with degradation time of 6 days with more than 90% degradation. Tulsi and its quantity for degradation were found out to be very less and economical too.

IV. Conclusion

As per the results, it is concluded that Organic food sample can be used for combustion further leading to less ash content. It has good energy content as it can be used as biofuel too. It is concluded that application of Neem and Tulsi on food sample for degradation is very effective and economical. Tulsi was found out to be very effective than Neem due to its requirement of less quantity for degradation. Other Ayurvedic plants and medicines were failed to degrade the food waste sample as it generates worms and insects in the sample kept for degradation. The degradation of solid organic waste is not only possible through chemicals but herbal drugs can also be effective and feasible and that take less time in degradation. There is drastic volume reduction and weight loss of the organic food waste collected after experimentations. Ayurvedic plants and medicines used for degradation are easily available in nature and household too. Therefore Neem and Tulsi either or in combination can be used in bins of food waste at residential or commercial activities for quick and economical degradation which shall decrease the huge load on garbage collection, transportation, disposal and other costlier ways of degradation of waste. The fertilizer generates after degradation of solid waste had shown improvement in the fertility of the soil as chemicals pays adverse impact to the soil.

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