# Conversion of Organic Kitchen Waste in to Compost: A Review

**Anuja Padole[1] Abhay Shelar [2]**
[1,2]Department of Civil Engineering
[1,2]Anantrao Pawar College of Engineering & Research, Pune, India

*Abstract*— As very nearly one-third of the food grown globally for human consumption is never consumed and is therefore wasted, with significant environmental, social and economic ramifications. The wastes are in the form of waste from vegetable and fruit market yard, FV peels, cooked and uncooked food in households etc. This paper reviews the utilization of kitchen organic waste for home composting. Kitchen waste comprises of vegetables and fruit peels, smashed fibre of fruits, spare cooked food items. The organic waste is high in nutrition and can be easily biodegradable and recycled. If the waste is not properly disposed without. Because of rapid urbanization, the production of kitchen waste continue to rise is increasing environmental risk which leads open dumping and landfilling. It causes harmful disease and environmental degradation. In India the total waste generated is 50 lakh metric tonne per day out of which total 50% waste is organic waste. Composting is low cost method for treating organic waste also provide nutrition to plants. Temperature, PH, MC content, C/N ratio these are the main parameter factor which contributes the composting efficiency. The research paper has a concern to minimize environmental impacts and maximize social and economic benefits.

## I. Introduction

India is developing country because of rapid urbanization and uncontrolled growth of population which leads in generating large amount of solid waste and other types of waste. The waste generation problem is very common and server in developing countries like India compared to developed country. The waste generation rate is more in major cities compared to small town due to improve standard of living and consumption pattern.as per 2011 census population residing in urban areas 31.16% is increased. Municipal solid waste is consist of on an average 40-45% of organic fraction and 20-30% inert fraction, rest being plastics, paper, rags and other components. Disposal of landfill and incineration without being treated is still practiced even it create impact on surrounding environment. It lead environmental degradation by producing methane gas and highly polluting leachate.

Composting is as alternative and effective low cost treatment which converts organic waste into compost without any negative impacts on environment which is valuable for soil fertility enhancement, stabilizing the environment. The different methods are used for composting and composting quality which mainly depends upon types of organic waste, composting methodology, composting time. Kitchen waste is rich in organic material contain 90% biodegradable material( Norazlin Abdullah & Nyuk Ling Chin).Kitchen waste is consist of vegetables and fruit peels , cooked and uncooked food is produced every day and everywhere.

## II. Literature Review

### *A. Conversion of Solid Organic Kitchen Waste into Useful Compost:*

In this paper they have fabricated a machine for converting the organic waste into compost on a small scale. They used kitchen waste to convert into compost Promote the use of natural fertilizer over artificial as far as possible. This reduces the load in landfill also reduce groundwater and surface waste contamination. Firstly removed moisture content of organic waste by squeezing method based on a type of juicer called “masticating juicer” which squeezes the fruits to get the juice out of it for that required 300W, 80 rpm motor to rotate the squeezing blade. In second stage it converted organic waste in pulverized form by two grinding stones of 150 mm diameter, one kept stationary and other rotated using DC motor so as to grind the squeezed waste matter. Then the waste is converted into compost by various composting method

### *B. Mass Balances and Life Cycle Inventory of Home Composting of Organic Waste:*

The author has made Life cycle inventory by experimental setup for home composting with six family in a year and assessed the burden in environment. It is made up of recycled polyethylene (PE) and polypropylene (PP) of 22 kg and it is equipped with a lid, an anti-fly net in the top to prevent flies from entering, a fine-masked steel net in the bottom to prevent rats. Unit 1 & 2 every week, Unit 3 & 4 six month, unit 5&6 not mixed at all. And 2.6-3.5 kg organic household waste fed per unit per week. Sampling was performed before addition of waste. Leachate compositions was minor part of this project collected from unit 1.By fixing static chamber gaseous emission were measured with photo acoustic monitor twice in week. C loss recorded 63-77 % & via leachate it was insignificant, the CO2 and CH4 emissions made up 51-95 % and 0.3-3.9 %, respectively loss recorded 51-68 % and the N2O emissions constituted 2.8-6.3 % of these losses & NH3 losses were insignificant. The N in leachate was in all cases insignificant and the remaining emissions were assumed to be gaseous N2. Heavy metals level in the final compost material was below all threshold values and the C/N ratios were 15.8-18.0. No necessary precaution was taken for GHG was not taken during entire process

### *C. Effects of Microbial Inoculation on Composting of Household Organic Waste Using Passive Aeration Bin:*

Author use 5 five 200-L passive aeration compost bins, a vertical pipe connected to an inverted funnel was installed in the middle of to study effect of microbial inoculation by converting household organic waste into compost. Once in day Wet weight of 1.6 kg with a ratio of 1:0.14 added to each bin for 60 days, furthermore composted for another 94 days. During the process temperature was recorded daily.

 

The food scrap 50% leftover food and 50% vegetable waste. The inoculants used were mature compost (MC) ,Effective Microorganism (EM)& LLD1.Bin 1was not inoculated ,bins 2 &3 were inoculated using EM(highly acidic), LDD1(Slightly acidic), 4 (2% MC) and 5 (5% MC) by Mature Compost (slightly basic), respectively. Compost sample randomly taken from mid portion for to examine pH, EC, MC, C, N, VS and microbial counts & temperature. In bin 4 &5 it is observed that stabilized state of MC has low available carbon compound so less reduction during composting compare to 1 to 3 bins. Whereas VS mass reductions in the 4&5 were slightly greater than the bins seeded by EM and LDD1 and the control Bin (1 to 3).Result shows that adding EM and LDD1 to facilitate composting may not be necessary as it compare with bin (5% MC).It is concluded that using commercial inoculating not required for composting of household organic waste due to the slight improvement of the finished compost.

*D. Greenhouse Gas Emissions from Home Composting of Organic Household Waste:*

In this paper author studied GHG emissions from home composting of organic household waste. The six home composting units cone-shaped made of recycled PE and PP used for experiment set up. Units 1 and 2 (mixing every week), Units 3 and 4 (mixing every sixth week), Units 5 and 6 (no mixing) fed with OHW and low amounts of garden waste. By using static flux chamber method, the GHG emissions measure and quantify. Temperature of compost recorded 2–10 C higher than the ambient temperature. The emissions of CH4 and N2O quantified as 0.4–4.2 kg CH4 Mg1 and 0.30–0.55 kg N2O Mg1.It is observed that unit which open to air recorded maximum emission compared to close one during entire year.8–12% CH4 emission estimated from the instant release during the actual material mixing. A greater load of OHW causes increased the emission of gases and subsequently increased the total EFs.

*E. Decentralized Composting of Vegetable Market Waste through Pit Composting:*

This paper describes the use of organic waste generated in the fruit and vegetable market into useful manure through pit composting method. A pit is designed with wood as it is cheaper than concrete. Before dumping the waste is shredded into 2 to 3 inch size. Total of 353 kg of vegetable waste dumped into the pit and left it to decompose for two months. The temperature was recorded up to 21 days as it reached room temperature. It indicates the killing of pathogenic microorganism and weed seeds and can be used as soil fertilizer. Waste it is kept under daily observation for two months. This Paper describe that the method of pit composting required less area and can be used within vegetable market premises This will not only reduce the volume of waste in landfill but also can contribute towards the requirement of bio-fertilizer of the country.

*F. Effects of Bulking Agents, Load Size or Starter Cultures in Kitchen-Waste Composting:*

In this paper author has used bulking agents like opinion, newspaper easily available agent which has high cellulose content use for composting of kitchen waste of nitrogen-rich subtract, vegetable scrap, and fish scrap and compost for 30 days and also added starter cutler for 2 and 6 kg. During processing C/N ratio measured, volatile solids, total organic carbon, temp recorded and kitchen composter is fabricated has three parts perforated cover, the body and a collector of water and end product. It is observed that onion peels more suitable for 2 kg load as compared to 6 kg because of lack of oxygen & ventilation which influenced the volatile solid loss, loss of nitrogen resp. Culture not showed any did not show advantages in accelerating the composting process.

## III. Conclusion

It is concluded that composting of organic kitchen waste is best way to recycle, reduced and convert into useful product of compost the without causing any pollution and harm to environment compared to other method of disposal. Composting method has more advantages like decreases landfill disposal load, requires less space, and reduces greenhouse gas emission and also restoring the quality of soils. By adding inoculant or cutler or bulking agent accelerate process of composting. Finally it concluded that it best way of composting organic waste of kitchen waste and useful in agricultural feed as it increases the soil nutrition and richness.

## References

[1] Taaib Anjum, Prashant Gowda, Shaikh Mohammed Rafi, Mohammed Akif Dalal: Conversion of Solid Organic Kitchen Waste into Useful Compost. IRJET, April 2019. e-ISSN: 2395-0056.
[2] Andersen, Jacob & Boldrin, Alessio & Christensen, Thomas & Scheutz, Charlotte. (2011). Mass balances and life cycle inventory of home composting of organic waste. Waste management (New York, N.Y.). 31. 1934-42. 10.1016/j.wasman.2011.05.004.
[3] Karnchanawong, Somjai & Nissaikla, Siriwan. (2014). Effects of microbial inoculation on composting of household organic waste using passive aeration bin. International Journal of Recycling of Organic Waste in Agriculture. 3. 113-119. 10.1007/s40093-014-0072-0.
[4] Andersen, Jacob & Boldrin, Alessio & Christensen, Thomas & Scheutz, Charlotte. (2010). Greenhouse gas emissions from home composting of organic household waste. Waste management (New York, N.Y.). 30. 2475-82. 10.1016/j.wasman.2010.07.004.
[5] Roy, Rajiv & Rejah, Rejaoon & Baruah, Kangkan & Saikia, Rasna & Dey, Surojit. (2017). Decentralized Composting of Vegetable Market Waste through Pit Composting: An Alternative for Urban City Waste. International Journal of Environmental Science and Development. 8. 295-298. 10.18178/ijesd.2017.8.4.966.
[6] Norazlin Abdullah, Nyuk Ling Chin, Mohd Noriznan Mokhtar and Farah Saleena Taip: Effects of bulking agents, load size or starter cultures in kitchen-waste composting, Abdullah et al. International Journal of Recycling of Organic Waste in Agriculture 2013. ISSN2251-7715
[7] Census of India: 2011 Registrar General & Census Commissioner, India 2/A, Mansingh Road, New Delhi-110011

 

[8] Palmisano AC, Maruscik DA, Ritchie CJ, Schwab BS, Harper SR, Rapoport RA (1993) A novel bioreactor simulating composting of municipal solid waste. J Microbiol Meth 18(2):99–112
[9] Ca´ceres R, Flotats X, Marfa` O (2006) Changes in the chemical and physicochemical properties of the solid fraction of cattle slurry during composting using different aeration strategies. Waste Manag 26:1081–1091
[10] Andersen, J.K., Boldrin, A., Christensen, T.H., Scheutz, C., in press. Mass balances and life cycle inventory for a garden waste windrow composting plant (Aarhus, Denmark). Waste Manag. Res., doi: 10.1177/0734242X09360216.
[11] Saleh Ali Tweib, Rakmi Abd Rahman and Mohd Sahaid Kalil, A literature review on composting. 2011 International Conference on Environment and Industrial Innovation
[12] MohdSahaidKalil, Saleh Ali Tweib and RakmiAbdRahman, A literature reviews on composting. 2015 International Conference on Environment and Industrial Innovation

 