A Review on Biogas Production from Kitchen Waste

Asst. Prof. Irshad Shaikh[1] Sagar S.Chavan[2], Vishnu G.Gaikwad[3], Sameer V.Hulawale[4]
Department of Civil engineering
[1]Assistant Professor,DPCOE, Wagholi, Pune.
[2, 3,4] UG Student,DPCOE, Wagholi, Pune.

Abstract-*With the quick process of building up land managing of the cooking place waste produced by the greatly sized group has become a great-sized hard question cooking place wastes having among its parts of plants used for food skins of fruit, fruit peels, smashed thread of fruits, let free without being taken as food things on a list, food grains and so on. These are amount with good food and necessary part of a system material, and can be easily took place again. In nearby years, persons making observations have had a look for the different methods of extraction of biogases like hydrogen , methane , and so on. From these biodegradable wastes. This paper papers the different make observations works deed on the putting-together of cooking place waste using anaerobic digestion process, biomethanation or composting hydrogen , an of great value gas is produced through the anaerobic fermentation of inside a country necessary part of a system waste in the being away of pretreatment or photo-fermentation, or bio augmentation of nearby fermentative groups of persons. Chronological dark and picture by camera fermentation process is also a coming-to-be-important way studied for producing of bio-hydrogen using cooking place waste. Esterification and hydrolysis process has also been put to use to synthesize cooking place waste forming of milk acid. Thermo-chemical hydrolysis of cooking place Waste through making the most out of temperature , time and chemical compositions , Fourier make great change infrared spectroscopy , micro-aeration process are studied coming out in bio-fuel producing. methane structuring putting together cooking place necessary part of a system acids produced from anaerobic digestion of cooking place waste using a got mixed together careful way made up of freezing , being made warm from cold, centrifugation, filtration and evaporation . Thus this paper paper business agreements with the work-place of different methodologies of cooking place waste use of.*

Keywords*-*solid waste management, food waste, kitchen waste, biogas production.

I. INTRODUCTION

One of the environmental friendly process utilizing the increasing amount of organic waste produced worldwide is biogas production through anaerobic digestion (AD).we can treat a wide range of waste streams, including industrial and municipal waste waters, agricultural, food industrial wastes as well as plant residues with this technology. The biogas process is part of a biological waste treatment method used commonly in waste treatment plants anywhere in the world. The only difference is that instead of releasing the gases produced during the fermentation process, the gases are collected and utilized as a gaseous fuel product. In the biogas production system, liquid organic wastes, animal manure, and solid organic wastes are led into a digester where an anaerobic process using bacteria ferments the wastes and produces biogas as a gaseous bi-product. The remaining non-digestible solids in the digester are collected as sludge that can later be returned back to the ground.

II. LITERATURE REVIEW

N.H.S.Ray et al., (2013) studied overall process of anaerobic decomposition of kitchen waste (KW) in three stages i.e. hydrolysis, acitogenesis, methanogenesis. Also they have reviewed the comparative properties and composition of biogas, parameters affecting the AD of KWs i.e. pH value, composition of KW, loading rate, retention time, operating temperature. In pre-treatment methods, they have described about trace element supplementation, pre-processing of KW and mechanical biological treatment to enhance AD. The study carried out in this review has shown that the AD of KW is a feasible alternative to biogas generation because it lowers the operating costs and reduces greenhouse gas emissions. The most successful AD processes at this time are thermophilic processes. This technology is superior to the land filing and also the aerobic composting.

Rama Dhanariya et al., (2015) studied Solid wastes can be used for production of biogas. They collect the waste from kitchen dustbin of girls hostel are collected then put all the collected waste in grinder mixture with water to make slurry of it also add Fresh cow dung then pour the mixture in 20 lit. Digester. The waste like Rotten tomato, Potato Waste Spinach, Onion ,Pea peels , Bread ,Pumpkin, Butter, Rotten Apples, banana peels, Paper ,cooked Rice, and other vegetables and fruits are used. Waste Material – 6kg, Water – 7lit. ,Cow dung – 1kg(app.) The digester was operated at room temperature varying from 25℃ to 36℃ and pH ranged to 5.5 to 8.5 throughout experiment with constant feed 7Kg KW. The gas generation directly depends on the initial characteristics of

the substrates. The food waste is the best source of methane generation due to its biodegradable capacity Biogas production from different food wastes could be enhanced by adopting biotechnological applications.

Wen-biao Han et al., (2015) studied the KW are collected from waste treatment plant and also excess sludge are collected from sewage treatment plant in Ordos city at an temperature of 35°c. Experimental devices are handmade drain AD bottle, drain gas gathering bottle, composition measurement water bottle etc. The degradation rates of COD, Total solids and Volatile solids are 49.7%, 37.8% and 30.0% respectively. In AD of excess sludge and KW are improve the digestion efficiency. The raw material are collected in pure state then the production of biogas is slightly lower than KW. The better disposal of KW as well as excess sludge.

Salma A. Iqbal et al., (2013) studied that the KW are collected from different halls of Shahjalal University of Science and Technology (SUST) and Surma residential area cow manure (CM) was collected from nearby village. In KW, total amount of rotten vegetables and rotten rice were near about 70%. Potatoes, eggs, fruits etc. Experiment was fabricated using ten digesters. Each digester was made of glass. The volume of each digester was 1 L and working volume was 0.5 L. In this study the volume of produced gas was measured by water displacement method. Experiments were operated in batch mode. Results of co digestion of KW and dairy manure in a two-phase digestion system conducted at laboratory scale showed that the gas production rate (GPR). So, among two experiments we observed that the biogas production rate was higher at 37°C than room temperature and co-digestion of KW with CM gave more biogas production than KW and CM alone. Sustainable bio-energy development could reduce higher level of deforestation. Under mesophilic digestion (37°C) maximum biogas production was produced under the conditions- OLR 200 gm/L and KW treated with 1.5% NaOH. A portable biogas reactor was fabricated and it was working efficiently under the optimum conditions. The anaerobic co-digestion of KW with CM is demonstrated to be an attractive method for environmental protection and energy savings.

Leta Deressa et al., (2015) studied various types of fruit and vegetable wastes (FVW), leftover foods from students' cafeteria of Bahir Dar University mixed with CM are used as substrates for biogas production in two 80Littres cylindrical plastic anaerobic digesters and two 2Littres plastic bottles. Construction of the Anaerobic Digesters are Construction of Anaerobic Digester for Semi Continuous System. Construction of Anaerobic Digester for Batch System. Fruits and Vegetable Wastes were collected from juice shops located in Mettu town. Leftover foods for the present study were collected from Bahir Dar university students cafeteria. The CM collected was not more than one day old. The wastes were hand-picked. The wastes were prepared for feedstock by chopping manually to a size of 1-4 mm. The process of biogas production is not merely source of energy, but also used as source of organic fertilizer. Biogas production process is microbial in nature is affected by temperature, pH, volatile fatty acids, microbial population and ammonia. The use of green technologies like AD, can avoid the emission of harmful greenhouse gasses and make a positive contribution to environmental targets.

S.Ashok Kumar et al., (2014) studied biogas production from KW water by AD. KW is collected from college canteen in slurry form .The mathematical model has been developed for batch process to determine biogas production. The experimental work has been done in 1litre AD tank. Biogas yield from the experimental work has been compare with mathematical model. For the hydraulic retention time of 10 days at 30 and organic loading rate of 1500 mg/ltr, it was found that biogas production of 2ml/day. pH and TSS has been monitored in this process. The gas was measured by water displacement method. Cost reduction has been calculated based on the replacement of L.P.G. They have concluded that after using the biogas we can save 365 cylinders per year which gets approximate saving of Rs.547500 and by-product of bio fertile is used for agricultural purpose. In batch process the COD conversion is occur (1500-90) and digestion reaches reduction with biogas yield of 0.0083 L biogas per 1 L of KW. The canteen waste, they producing 5000 L/day.

A. Apte et al., (2013) studied the waste sample from Bhavan's college canteen, Sardar Patel Canteen, Sardar Patel hostel Mess and SP Jain hostel Mess. Sampling was carried on during peak hours of solid waste collection. From the kitchens during rainy season. The bucket sampling method was adopted. The moisture content of the waste varied from 65-80% as expected from the KW. Ash content of solid waste from the kitchens varied between 8-23 % which is in the range of ash content expected in municipal solid waste (3 -28%). It was observed that the volatile matter varied from 80-92%. This is comparable to the 92% of volatile matter content obtained from the KW. The calorific value for this set of KWs vary from 15000-25000 kJ/kg. High moisture content makes thermal recovery from solid waste uneconomical. AD, which requires high moisture content for the sustenance of the methane bacteria, was the preferred alternative for energy recovery from organic waste in the Bhavan's campus. A higher volatile matter content leads to a better biogas yield. The test samples contained an average of 85% of volatile matter.

Navneet et al., (2016) studied and compared biogas production using KW and poultry waste. KW was consist of cooked rice, vegetables and non-used vegetables waste. This mixture is crushed by mixer grinder and slurry mixing with water. Separate container for coconut shells, egg shells, peels and chicken, mutton bones. Sample were taken from homogenized slurry. Where in poultry waste wood shavings, coffee hulls, dry grass and chopped corn cobs were there;

The amount of gas produced was monitored by measuring its volume and average temperature daily. It was found that the generation of biogas used to take place after 10 to 15 days from the day of loading the digester. It was observed that the cow dung gas which more in 6–10 days was upto35% gas is produced. As compared to KW the methane gas which is obtained more in poultry waste upto 48.13%. 120 litre capacity plastic drum is used as bio-digestion tank

III. CONCLUSION

The food waste is the best source of methane generation due to its biodegradable capacity. We can improve AD by using additives. Temperature of 37ºC is more favorable for biogas production. A higher volatile matter content leads to a better biogas yield. methane gas is obtained more in poultry waste upto 48.13%.

REFERENCES

[1] N.H.S.Ray, M.K.Mohanty, R.C.Mohanty, (AD) of KWs:Biogas Production and Pretreatment of Wastes, A Review, International Journal of Scientific and Research Publications, Volume 3, Issue 11, November 2013 1 ISSN 2250-3153, 1-6.

[2] Rama Dhanariya, Dr. Sarita Sharma, Dr. Ashok K. Sharma, Dr. Sanjay Verma, A Study of Biogas Production from Different KW, International Journal of Chemical and Physical Sciences, IJCPS Vol. 4, No. 1, Jan-Feb 2015, 21-25.

[3] Wen-biao Han, Yu-zhu Zhao, Hao Chen, Study on Biogas Production ofJoint (AD) with Excess Sludge and KW, International Conference on Solid Waste Management, 5IconSWM 2015, 756 – 762

[4] Salma A. Iqbal, Shahinur Rahaman, Mizanur Rahman, Abu Yousuf, (AD) of KW to produce biogas, 10th International Conference on Mechanical Engineering, ICME 2013, 657-662

[5] Leta Deressa, Solomon Libsu, R. B. Chavan , Daniel Manaye , Anbessa Dabassa, Production of Biogas from Fruit and Vegetable Wastes Mixed with Different Wastes, Environment and Ecology Research 3(3): 65-71, 2015.

[6] S.Ashok Kumar, C.Marimuthu, E.P.Balaji, S.Shakeel Riswan, Biogas Production from KW Water using USAB Reactor, International Journal of ChemTech Research CODEN (USA): IJCRGG ISSN : 0974-4290 Vol.6, No.9, pp 4135-4142, September 2014.

[7] A. Apte, V. Cheernam, M. Kamat, S. Kamat, P. Kashikar, and H. Jeswani, Potential of Using KW in a Biogas Plant, International Journal of Environmental Science and Development, Vol. 4, No. 4, August 2013,370-374.

[8] Navneeth & Kiran M Sannakki, Comparative Study Of Biogas Production Using KW And Poultry Waste, International Journal of Computational Sciences And Information Technology (IMPACT: IJCSIT) Vol. 2, Issue 1, Jun 2016, 1-10.