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Production of Bogas by Using Agriculture Waste and Kitchen Waste

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ABSTRACT: Pragmatically, there are still obstacles in the way of expanding biogas generation from kitchen and agricultural waste, to find the gas efficiency compared between to different sources of waste. Additionally, producing biogas from organic waste gas a major positive impact on the environment. Biogas production helps slow down climate change by keeping these materials out of landfills, where they would break down anaerobically and emit methane, a powerful greenhouse gas. Anaerobic digestion is one of the major biological- based technologies for converting organic waste to energy. The end product of the process in the production of biogas that can be harvested as renewable energy and a nutrient-rich di gestate that can be transformed as bio fertilizer. Kitchen waste like food scraps, vegetable peeling, and Left overs, as well as agriculture residues like crop residues, manure, and straw, are plentiful and frequently neglected resources. These wastes are converted into biogas, which is mostly made of carbon dioxide and methane, by the process of anaerobic digestion, which is the breakdown of organic matter by microbes in the absence of oxygen. Temperature, PH levels, retention time in the digester, and waste content are some of the factors which affects bio gas production. When compared to mono-digestion, co- digestion of kitchen and agricultural waste have demonstrated to increase biogas generation because it offers a varied microbial population and a balanced nutritional mix. The result revealed that kitchen waste was found as efficient biogas producer than agricultural waste. Biogas production from kitchen waste offers great promise as a sustainable energy option with several socioeconomic and environmental benefits with continuous research, innovation, and cooperative efforts

Key words: Kitchen waste, Agricultural waste, Bio gas, Valuable energy.

I.INTRODUCTION:

Concerns about energy security, attempts to lessen the environment impact of conventional fuels, advancement in living standards, and renewable technology are all contributing to a sharp rise in the use of renewable energy. In order to promote renewable alternatives, bioenergy might be a key component. The amount of biomass that is converted to energy has increased from 65GW in 2010 to 120 GW in 2019 as a result of factors such as climate change, sensible energy production, distributed generation growth, and environmental concerns. Unlike fossil fuels, biogas is naturally renewable since it comes from biomass, which is essentially a solar energy through the process of photosynthesis. It will take long-term potential measures for sustainable development to find solutions to the world's current environmental issues and potential lack of fossil resources. Renewable energy sources seem to be among the best and practical options in this regard. Worldwide, biogas continues to be a sustainable energy source sourced from plants that utilize solar radiation for photosynthesis. Roughly 90% of methane released into the atmosphere comes from biogenic sources, or the breakdown of biomass. The remaining portion comes from fossil sources (such as petrochemical operation). In the northern tropospheric methane concentration amount to about 1.65ppm, substract and materialbalance of biogas production in principle, all organic materials can ferment or be digested. However, only homogeneous and liquid substrates can be considered for simple biogas plants: faces and urine from cattle, pigs and possible from poultry and the wastewater the urine should be used.

LITERATURE SURVSEY

Using Agriculture Waste for Biogas Production as A Sustainable Energy Supply For Developing Countries. (Yaovi ouezou Azouma et.al., 2018): The study of biogas production technology is intended as a sustainable decentralised energy supply, which should meet the economic and social conditions of developing countries in the west African region. The paper briefly outlines the current state of small-scale biogas production in Africa. Evaluation Of Agriculture Waste For Biogas Production (Malee Suntikunaporn et.al.,2014) The effect of additional waste of agriculture waste to anaerobic digestion system were studies using food scraps as a model substract and cow dung as aninoculation. A Review on Biogas Production from Food waste (Rama Dhanariya et.al., 2014): In this study we have reviewed the anaerobic digestion reaction, biogas production , challenges & management of kitchen wastes. Production Of Biogas From Different Waste Materials: A review (Vandana Bhagat et.al., 2021):Biological waste are found as municipal wastes, kitchen wastes, agriculture waste and animal wastes and these can utilize with the help of various technologies adoption for leading to the use of renewable energy systems effectively and efficiently. In this article, author can discussed regarding the biogas synthesis from utilization of various kind of biological /organic waste by application of anaerobic fermentation. Review On Research Achievements Of Biogas From Anaerobic Digestion (Chunlan mao et. al., 2015): The objective of this paper is to provide a comprehensive overview of AD research achievement in biogas production and to clarify the future outlook on of biogas production.

II. PROPOSED SYSTEM: SOURCE OF FEEDSTOCK:

A wide variety of feed stocks can be used to produce biogas. For this report, the different individual types of residue or waste were grouped into two broad feedstock categories.

1. Agriculture waste
2. Kitchen waste

Kitchen waste and agricultural wastes were obtained from canteen and local market, field and finely cut then stored as slurry in a plastic tank. The agriculture waste like a cow dung 8litter, Sugarcane bagasse 5.5liter, Groundnut shells 5.5 litter, Residues left over from field 5.5 litter. The kitchen waste are food scraps 8litter, fruit peels 5.5 litter, Egg shells 5.5 litter, tea powder 5.5litter that are filled into the tank.

Fig-1(Fruit waste)

Fig-2(Agri waste) Fig-3(Kitchen waste)

AGRICULTURE WASTE:

- Agricultural wastes obtained from rural field and college field and were finally cut then stored as slurry in a plastic tank.

- Efficient collection and processing of agricultural wastes are essential for maximizing biogas production and ensuring the sustainability of waste management.

KITCHEN WASTE:

- Kitchen wastes were obtained from college canteen and fruit peels from fruit section in canteen and were soaked with water and processed to dump into the tank.

- By effectively collecting and utilizing kitchen waste of biogas production, communities can reduce landfill pressure, minimize greenhouse gas emissions, and harness renewable energy from organic waste streams.

ANAEROBIC DIGESTION: A simplified version of the floating drum set-up for anaerobic digestion is shown Fig -4

Fig-4

The structure designed for two 50-liter drums will be utilized for both dumping and the hydrolysis process. Hydrolysis serves as the initial step in converting organic materials into biogas. A biogas plant typically includes an airtight digester tank, a gas holder, a mixing device, and a gas regulator valve. This system allows for the conversion of waste into sustainable energy and fertilizer, with positive effects on the environment.

The Digestion Process: The Biogas produced by the putrefactive bacteria. Which break down the organic material under condition. This is called the anaerobic Digestion

The digestion process consist of two Phases:

1. Acid Formation
2. Methane Formation

The digester depending on several factors:

- The size of the digester
- Operating temperature inside the digester
- Used Mixing technology
- Used feedstock and the DM (Dry Mater) value of the Biodegradable feedstock.

All the Feed Material consist of:
Organic solids

- Inorganic
- Water

The organic materials are broken down to produce biogas. The inorganic materials are utilized as ballast, which is not impacted by the process of digestion. The addition of water imparts fluid qualities to the substrate. This is crucial to the bio gas' preparation. When the slurry is liquid, it is simpler for the methane bacteria to interact with fresh bacteria. This quickens the process of digestion. Regularly increased the output of gas.

III. BIOGAS:

Biogas consist of about 60% methane and 40% carbon dioxide. It also contains small proportion of other substances, including up 1% hydrogen sulphide.

The methane content falls to as little as 50% if retention time is short if the methane content is considerably below 50%, biogas is no longer combust the first gas from a newly filled biogas is no longer combust. The first gas from a newly filled biogas plant contains too little methane. The gas formed in the first three to five days must there for be discharged unused.

The methane content depends on the digestion temperature. Low digestion temperature give high methane content, but less gas is then produced.

The methane content depends on the feed material.

- Cattle manure
- Kitchen waste
- Field waste

IV. CONCLUSION:

In conclusion, kitchen trash and agricultural waste have different levels of biogas plant efficiency. Because agricultural waste has a larger organic content, it often produces more biogas, such as crop residuces and animal dung. Though usually in lower amounts, kitchen trash can also be effectively transformed into biogas due to its high content of organic materials. It is possible to compare the effectiveness of producing biogas from kitchen and agricultural waste by looking at thing like gas yield, cost– effectiveness, and environmental impact. Because it contain more energy, agricultural trash might provide more gas, but kitchen waste is more easily accessible and easier to gather.

The decision between the two is mostly influenced by variable including output desired, processing techniques, and availability with varying efficiency and concerns, both sources support waste management and sustainable energy production. The finding showed that kitchen waste produced biogas more efficiently than farm waste. With ongoing study, innovation, and collaborative efforts, biogas production from kitchen trash hold great promise as a sustainable energy option with various socioeconomic and environmental benefits.

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