

# OPTIMISATION OF FILTRATION PROCESS TO SEPARATE WATER FROM WASTE OF GOBAR-GAS PLANT

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**Abstract-** Biogas plant (BGP) with anaerobic digestion providing a facility to generate manure (Biogas spent slurry) and energy generation. The digested biogas slurry (DBGS) is rich in macro and micro nutrients that provide essential plant nutrients for longer period. Biogas slurry may be considered as a good quality organic fertilizer for sustainable agriculture. Biogas slurry provides huge nutrient potential for vegetative and reproductive growth of field crops with long term sustainability. By applying the digested biogas slurry (DBGS) in the field for long term basis help in reducing fertilizer demand and provide an eco-friendly way of maintaining productivity and soil health. In this study we are summarizing nutrient potential of digested biogas slurry (DBGS) and relation with synthetic fertilizers in India, as a potential source.

**Keywords:** Digested biogas slurry (DBGS), Nutrients, Sustainability, Fertilizers.

## 1. INTRODUCTION

Biogas slurry is a by-product of anaerobic digestion that produced from biogas plant and also produces biogas (combustible methane gas) that is used for cooking, lighting and running engines. Bio slurry can be used to fertilize crops directly or added with other organic materials and synthetic fertilizers. Bio slurry is a digested source of animal waste and if urine (animals) is added, more nitrogen is added to the bio slurry which can speed up the compost-making process in short period of time. This improves the carbon/nitrogen (C/N) ratio in the slurry that provides easily nutrient availability to plants and soil biota. The biogas slurry has 93% water and 7% of dry matter, of which 4.5% is organic matter and 2.5% inorganic matter. The digested biogas slurry also contains phosphorus, potassium, zinc, iron, manganese and copper, out of which many depleted from soil due to intensive agricultural practices. Bioslurry can also be used to build up health fertile soil for crop production. Bio slurry contains easily-available plant nutrients and it contains higher amounts of nutrients and micronutrients than composted manure and FYM (Farm Yard Manure). The effects of bioslurry application are comparable to the effects of the application of synthetic fertilizers. Hence, digested bioslurry can be a precious alternative to synthetic fertilizers. Biogas slurry is considered a good source of organic fertilizer as it contains considerable amounts of both macro (N, P, K) and micronutrients (Zn, Mn, B) that are necessary for plant growth. Use of biogas slurry is providing a sustainable way for agriculture, environment and farming communities

## 2. SURVEY

The shortage of Fossil Fuels has become a national issue in rural and urban areas, Biogas technology has gained interest at national level. India has great potential to produce biogas to meet its energy demands. This work of study and survey briefly explain the advantages, drawbacks, methods and, the challenges behind the proliferation of the biogas technology at national level in India. As we all know that, this project is based on separation of liquid from gobar-gas slurry. So we visited on the plant of gobar-gas (Alodi, Wardha) to collect some details, as we have done some conversation with the owner Mr.Balkrushna Mauskar sir they provide us sufficient details about the process and set-up of their plant. So taking their personal opinion on the basis of their experience they have suggested us to make a filtration unit to separate the liquid from the gobar-gas slurry. According to their suggestion we had collected the sample from the plant and tested it in the soil mechanics lab of RAMKRUSHNA BAJAJ COLLEGE OF AGRICULTURE, PIPRI, WARDHA.

As the college gave us the sample result of NPK (Nitrogen, phosphorus, Potassium).

**Table No.1.** Nutrients composition of biogas slurry

Sr no.	N(%)	P(%)	K(%)	References
1	1-1.8	0.8-1.2	0.8-1	Gupta, 1991
2	1.4-1.8	1.5	0.8-1.2	DST, GOI 1981
3	1.5-2	1	1	Tripathi, 1993

### 3. OBJECTIVES

- Ability to significantly reduce water pollution by eliminating harmful fertilizers that seep into run-off water and ruin the natural environment.
- Organic materials and fertilizers improve the soil texture, allowing it to hold water longer, and increase the bacterial and fungal activity in the soil. So, they not only assist your plants, they help the soil.
- This exposure comes from a chemical reaction between nitrites and causes DNA damage, oxidative stress, lipid peroxidation, and pro-inflammatory cytokine activation, which together leads to increased cellular degeneration and death.
- The liquid from biogas slurry gives the results in better soil quality and reduced pollution from fertilizer.

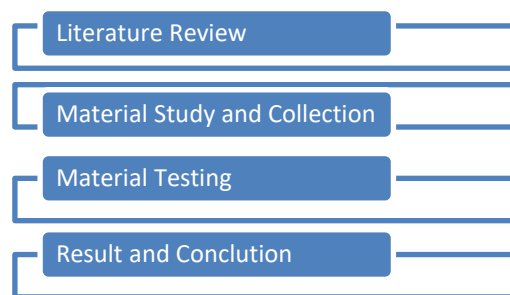
### 4. SCOPE

1. This exposure comes from a chemical reaction between nitrites and causes DNA damage, oxidative stress, lipid peroxidation, and pro-inflammatory cytokine activation, which together leads to increased cellular degeneration and death.
2. Huge nutrient potential for vegetative and reproductive growth of field crops with long term sustainability.
3. Provide bio-manure and are helpful in dealing with the problems of waste management.
4. It will be economical for the farmer as compare to chemical fertilizers.

### 5. ADVANTAGES

1. It works as medicine for plant.
2. The slurry left over after the filtration is very rich in Nitrogen, and Phosphorus. Therefore, it is used as manure to fertilize the crops and land.
3. It will be economical It for the farmer.
4. The Biogas plant Spent Slurry (rich in nutrients than fresh cow dung) is used as Manure for plantation in gaushala and all around it and this slurry is also vermin-composted and marketed.

### 6. METHODOLOGY



#### 3.1 Overview

A literature review is a text written by someone to consider the critical points of current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work. Also, a literature review can be interpreted as a review of an abstract accomplishment.

Most often associated with academic-oriented literature, such as a thesis or peer reviewed article, a literature review usually precedes a research proposal and results section. Its main goals are to situate the current study within the body of literature and to provide context for the particular reader. Literature reviews are a staple for research in nearly every academic field

A systematic review is a literature review focused on a research question, trying to identify, appraise, select and synthesize all high quality research evidence relevant to that question. A Meta-analysis is typically a systematic review using statistical methods to effectively combine the data used on all selected studies to produce a more reliable result.

**R. AHMED, N. JABEEN 2009** According to R. AHMED N. JABEEN the slurry can with easily be brought to places that need organic fertilizers. The most important benefit is that the slurry is a very effective fertilizer that can improve the growth of the crops. Nitrogen is one of the major nutrients required for plant growth

**ALAM 2006** According to ALAM the economic value of organic fertilizer to a farmer is the value of increase in crop yields and/or crop quality that is derived from its use.

**DAHIYA 1985** According to DAHIYA Most of time, optimum crop yield and soil fertility levels can be achieved through the combination of synthetic and organic fertilizers. Synthetic fertilizers are expensive and most small-scale farmers cannot afford them for a long duration. The high costs involved make it essential for most of developing and African countries to find an alternative to synthetic fertilizers.

**DIKSHIT 2010** According to DIKSHIT India has huge number of livestock population near about 512.05 million heads in 2012. In India, the total estimated potential of biogas plant is 12 million but till now 4 million plants are installed which can generate daily on an average basis about 35 million cubic meter of biogas. So that, there is only near about 33% of the potential over the period of almost 40 years has been achieved by this cumulative installation of biogas plants.

**ISHIKAWA 2006** According to ISHIKAWA The biogas slurry has 93% water and 7% of dry matter, of which 4.5% is organic matter and 2.5% inorganic matter. The digested biogas slurry also contains phosphorus, potassium, zinc, iron, manganese and

copper, out of which many depleted from soil due to intensive agricultural practices. Bio slurry can also be used to build up health fertile soil for crop production.

**HJORTH M, 2009** Generally farmers use the digested slurry to leave in the nearby area of plant such or some time it is disposed in nearby watercourse. Some users transport it as much in the fields and left in irrigation channels so that it can reach crop through water. (Horthy et al), 2009.

## 6.2 MATERIAL STUDY AND COLLECTION

- Steel net
- Steel angle
- Nuts and bolts
- Strips
- Bearing wheel

### 6.2.1 DESIGN OF MOULD

After collecting all the materials, we had fitted all the parts together to design a mould in order to separate the liquid from biogas slurry.

#### 6.2.1.1 Dimensions of mould

$$\begin{aligned} \text{Length} &= 0.457 \text{ m} \\ \text{Width} &= 0.304 \text{ m} \\ \text{Depth} &= 0.152 \text{ m} \\ \text{Area} &= 0.457 \text{ m} \times 0.304 \text{ m} \\ &= 0.139 \text{ sq.m} \\ \text{Volume} &= \text{Area} \times \text{Depth} \\ &= 0.139 \times 0.152 \\ &= 0.021 \text{ cu.m.} \end{aligned}$$

## 6.3 METHOD OF SEPARATING BIOSLURRY

### 6.3.1 FILTRATION PROCESS ON BIO SLURRY

Filtration, the process in which solid in a liquid are removed by the use of a filter medium that permits the liquid to pass through but retains the solid. The primary purpose of filtration process is to separate liquid from biogas spent slurry and to remove solid particles. Filtration process is low cost and easily can be used by small farmers. The slurry from the biogas plant is collected in one of the mould and the mould is provided with the filtration media, by through which the liquid is separated from the slurry of the biogas plant. Filtration mould make a great long-term solution when compared to dewatering bags.

### 6.3.2 SEDIMENTATION PROCESS ON BIO SLURRY

Sedimentation is the process of allowing particles in suspension in water to settle out of the suspension under the effect of gravity. The purpose of sedimentation is to enhance the filtration process by removing particulates. This is achieved as the liquid usually passes slowly at variable speeds through the tank. A layer of sludge settles at the bottom of the tank and is periodically removed. The slurry from the biogas plant is collected in one of the mould and it is kept their for sometimes for sedimentation process. Further after this process the separated liquid is collected in the tank which is placed below the mould and the remaining particles which is present in filtrated liquid is also settled down in the tank.

## 7. CONCLUSION

Biogas slurry may be considered as a good quality organic fertilizer in sustainable agriculture for maintaining the quality of produce. Biogas slurry has potential to provide a considerable amount of both macro and micro nutrients besides appreciable quantities of organic matter. Along the richness in nutrients it also has very low amount of heavy metals as compared to synthetic fertilizers. Bio-gas slurry (Dry-DBGS & Wet-DBGS) is environmentally friendly, has no toxic or harmful effects and can easily reduce the use of chemical fertilizers up to 15-25%.

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