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# Production of Biogas by the Supplementation of Distillery Industry Sludge on Cattle Dung

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**Anaerobic digestion of organic matter is gaining importance due to interest in biogas recovery, plant nutrient enriched slurry and environmental protection. During the past three decade of green revolution in India, there is increasing concern about environment deterioration and decreasing soil health and fertility. Use of organic manure is therefore an essential approach towards restoring environment and soil productivity. Biogas slurry enriched with distillery sludge can be a new source of organic manure in areas where biogas technology is introduced because distillery sludge contains higher quantity of nitrogenous compound and methanogenic bacteria. Laboratory scale digesters of 4 liters capacity with 2.5 liters working volume were set up in batch digestion. Cattle waste was supplemented with 0, 5, 10, 15, & 20% distillery sludge and digestion was initiated by 10% inoculum from anaerobic digestor plant. Therefore it is concluded that 20% distillery sludge supplementation with cattle dung can be utilized for improved biogas recovery as well as potent organic manure.**

**Key words:** Biogas, Distillery Industry Sludge, Cattle dung, Methanogenic bacteria, Anaerobic-digestor.

Fuel is one of the most important demand in the day today life due to the increased number of automobiles, house hold purpose, Industrial needs, & Research activities. India has a huge source of cattle farms. Every day these farms discharged cow dung on land without proper utilization, leads to serious health hazards to rural and semi urban populations. The cattle dung is used as a raw material for the production of biogas by the implementation of anaerobically digested distillery sludge microbial flora (Goyal *et al.,* 1996; Samuel, 1986)[1-2]. In the distillery sludge, the amount of nitrogenous source and methanogenic bacteria are to be high and is more vital for the production of biogas in enormous volume within the less duration of time. Simultaneously, the distillery industry sludge is also to be utilized as organic manure for the improvement of soil fertility at the end of the biogas production process (Ameyama *et al.*, 1984; Gaur, 1985)[3-4]. The trend of using biogas as a biofuel to reduce the smoke emission and also avoid environmental pollution. Hence, there is a considerable interest in the production of biogas from cattle dung with the supplementation of distillery sludge. With a view to develop an economically feasible technology to improve the

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yield of biogas and also to utilize the wastes of cattle farms and distillery Industry sludge.

## MATERIAL AND METHODS

### Inoculum and Medium preparation

The laboratory scale digesters are made in the volume of 4 liters each. The digesters are loaded by cattle dung with the supplementation of various percentage of distillery sludge *viz.*, 0, 5, 10, 15, & 20%. The digestion process is initiated by adding 10% bioinoculum from anaerobic digester plant. The consistency of the cattle dung is very important for the process.

### Biogas collection and assay

Biogas productions were monitored daily and compare its volume with control digester containing cattle dung only. The yield of biogas had measured in the unit of l/ l/d. The biomass was measured by the method of Henson and Smith (1985)[5].

## RESULTS AND DISCUSSION

The biogas yield from the cattle dung fortified with various percentage of distillery sludge *viz.*, 0, 5, 10, 15, & 20% in the biodigester plant for 60 days is 2.346, 2.814, 3.648, 5.322, 8.052 l/l/d respectively in respect to control (table). From the observation of biogas yield from the cattle dung is mainly depends on the sources of microbial consortium in the distillery industry sludge and also in the dung. The potency of organic biomanure is also estimated based on the biomass from the biodigester. The weight of biomass which is obtained from the digester after 60 days are 40.56g/l, 42.18g/l, 47.52g/l, 56.58g/l, 57.48g/l, and 58.2g/l at the various concentration of 0, 5, 10, 15, and 20% of distillery industry sludge.

**Table 1.** Yield of biogas and biomass from cattle dung with the supplementation of distillery industry sludge and 10% bioinoculum

| Ex. No. | Substrate | Days | Total gas l/l | Total gas per day ml/l/d | Total biomass g/l | Total biomass per day g/l/d |
|---|---|---|---|---|---|---|
| 1 | CD only | 60 | 1.86 | 31.0 | 40.56 | 0.676 |
| 2 | CD+10% BI | 60 | 2.346 | 39.1 | 42.18 | 0.703 |
| 3 | CD+10% BI+5%DIS | 60 | 2.814 | 46.9 | 47.52 | 0.792 |
| 4 | CD+10% BI+10%DIS | 60 | 3.648 | 60.8 | 56.58 | 0.943 |
| 5 | CD+10% BI+15%DIS | 60 | 5.322 | 88.7 | 57.48 | 0.958 |
| 6 | CD+10% BI+20%DIS | 60 | 8.052 | 134.2 | 58.2 | 0.97 |

CD - Cattle Dung; BI - Bioinoculum; DIS - Distillery Industry Sludge

The observed results are coincided with the report of Subba (1980)[6] and Stafford *et al.* (1980)[7]. According to their experimental output, they concluded the microbial action in anaerobic condition had to be good and improved the yield of biogas and biomanure from the plant.

## CONCLUSION

Fuel is one of the most important demand for our country. We need to overcome this problem, by using the organic waste from various sources. The cattle farm's waste is to be used carefully with the supplementation of distillery Industry sludge and improve the digestion process by adding 10% bioinoculum. From this study, the results concluded that the percentage of biogas yield is much more improved due to the addition of distillery Industry sludge, by means of stabilization of the cattle dung and its digestion. Therefore it is strongly concluded that 20% distillery sludge supplementation with cattle dung can be utilized for improved biogas recovery as well as potent organic manure.

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