MICROBES IN HUMAN WELFARE

MICROBES IN PRODUCTION OF BIOGAS

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In rural areas of developing countries, it is a common practice to use animal dung for making dung cakes which are used for fuel. Thus, a potential fertilizer of the agricultural fields is wasted in Burning.

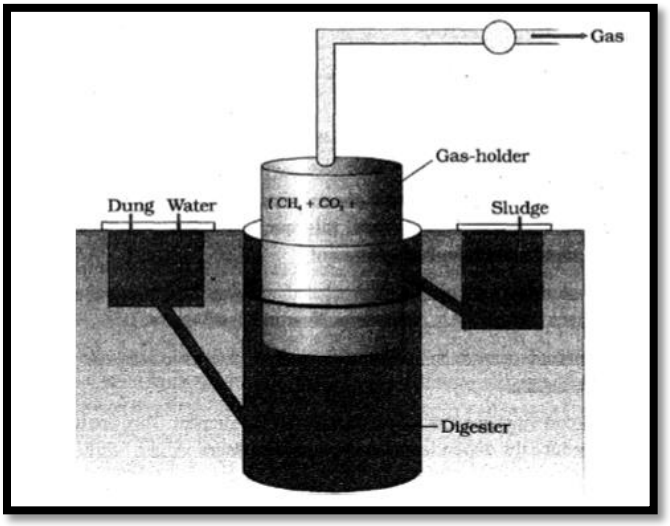
The dung Can be put to a better use if it is used to generate Bio gas (Gober Gas) and side by side a stabilized residue to serve as the fertilizer.

The energy yield of Biogas is lower than that of dung cakes but the efficiency of Biogas burners is very high. Thus, over all result indicates that production of biogas is more cost effective.

Biogas is a mixture of gases (containing predominantly methane) produced by the microbial activity and which may be used as fuel. You have learnt that microbes produce different types of gaseous end-products during growth and metabolism. The type of the gas produced depends upon the microbes and the organic substrates they utilise. In the examples cited in relation to fermentation of dough. cheese making and production of beverages the main gas produced was CO_2. However certain bacteria which grow an aerobically on cellulosic material produce large amount of methane along with CO_2 and H_2. These bacteria are collectively called methanogens and one such common bacterium is Methanobacterium. These bacteria are commonly found in the anaerobic sludge during sewage treatment. These bacteria are also present in the ruinen (a part of stomach) of cattle. A lot of cellulosic material present in the food of cattle is also presenting the rumen. In rumen. these bacteria help in the breakdown of cellulose and play an important role in the nutrition of cattle. Thus, the excreta (dung) of cattle commonly

called goober is rich in these bacteria. Dung can be used for generation of biogas, commonly called goober gas.

The biogas plant consists of a concrete tank (10-15 feet deep) in which bio-wastes are collected and a slurry of during is fed. A floating cover is placed over the slurry, which keeps on rising as the gas is produced in the tank due to the microbial activity. The biogas plan has an outlet, which is connected to a pipe to supply biogas to nearby houses. The spent slurry is removed through another outlet and may be used as fertilizer. Cattle dung is available in large quantities in rural areas where cattle are used for a variety of purposes. So biogas plants are more after build in rural areas. The biogas thus produced is used for cooking and lighting. The technology of biogas production was developed in India mainly due to the efforts of Indian Agricultural Research Institute (IARI) and Khadi and Village Industries Commission (KVIC)



The organic wastes from the farmhouse cow dung, wastes, urine, faces etc. can be used economically for producing of Gober gas (Bio gas). It consists of methane (50-70%), CO_2 (30-40%) and traces of hydrogen, nitrogen and hydrogen sulphone.

Biogas produced by anaerobic fermentation of waste biomass.

Anaerobic fermentation of waste biomass can be visualized in three stages: -

1. The facultative anaerobic microbes degrade the complex polymers to simple monomers by enzymatic action.

The Polymers like cellulose, hemicelluloses, proteins and lipids get degraded into monomers but lignin's and inorganic salts are left as residue because they do not degrade.

2. In second stage, monomers are converted into organic acids by microbial action under partially aerobic conditions which are finally converted to acetic acid.

3. In third stage acetic acid is oxidized into methane by the activity of anaerobic methanogenic bacteria. These bacteria are commonly found in the anaerobic sludge during sewage treatment. These bacteria are also present in the rumen (a part of stomach) of cattle. A lot of cellulosic material present in the food of cattle is also present in the rumen. In rumen, these bacteria help in the breakdown of cellulose and play an important role in the nutrition of cattle. In this whole process digestion of cellulose takes place at very slow rate so that it is the "rate limiting factor in biogas production".