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Co-digestion with poultry feathers enhances biogas production from bagasse

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Lignocelluloses are the major components of different wastes generated from various industries, forestry, agriculture and municipalities. Hydrolysis of these materials is the first step for digestion to biogas (methane). However, enzymatic hydrolysis of lignocelluloses without pretreatment is usually not effective due to high stability of the materials to enzymatic or bacterial attacks. The C:N ratio of various agro wastes is also an important factor which decides biogas output of a substrate. Chicken feather hydrolysate, an additive enhances biogas production by supplementing nitrogen/amino acid requirements. Bagasse is the residue after cane juice extraction from sugar cane processing industries, which are at present not properly utilized. Pretreatment of bagasse exposes the cellulose making it accessible to cellulase enzyme. Both chemical and biological pretreatments are possible. Similarly adding chicken feathers obtained as poultry slaughter wastes considerably enhances biogas production. Powdered bagasse was deglinified using 1% sodium hydroxide, neutralized and the resulting material is mixed with acid hydrolysed chicken feathers and biomethanated. The chicken feather is hydrolyzed using 0.5 m sodium sulfide. The gas produced is quantitated by water displacement method. *Pleurotus florida* fungi was grown on crushed bagasse for 15 days in the presence of 1.5% lactose, 0.5% urea and 0.1% cupric chloride and the resulting material is mixed with chicken feather hydrolysate and biomethanated. The gas is quantitated by water displacement method. Compared to control (non delignified bagasse without chicken feather hydrolysate) there was substantial increase in biogas production using both chemically and biologically delignified bagasse. In case of biologically delignified bagasse, increase in biogas production is less compared to chemically delignified bagasse. Compared to control, there was considerable increase in biogas production after supplementing chicken feather hydrolysate in both chemical and biologically delignified bagasse. Pretreatment of bagasse results in improved biogas production. Chemical method is faster, effective and cheaper than biological method. Chicken feather hydrolysate as nitrogen/amino acid additives enhances biogas from the delignified bagasse.

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Biodegradation of chrysene by *Ochrobactrum intermedium* and *Enterobacter* sp. isolated from the surrounding soil of Mathura oil refinery

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Chrysene degrading bacteria were isolated from the surrounding soil of Mathura oil refinery, Uttar Pradesh, India. The strains were identified as the *Ochrobactrum intermedium* and *Enterobacter* sp. based on morphological, physiological, biochemical tests and 16s rRNA gene sequencing. Chrysene degrading bacteria from the contaminated soil were isolated by enrichment culture technique. Isolates with high chrysene degrading ability were characterized by their growth on chrysene supplemented minimal salt media. Isolated strains were incubated in MSM medium with chrysene supplemented as main carbon and energy source for seven days at 50 ppm (50 mg/l) and 100 ppm (100 mg/l) of chrysene concentration respectively. There were visible changes in the color of growth medium suggesting the degradation potential of the isolated strains and increase microbial biomass was confirmed by OD (optical density) at regular intervals. *Ochrobactrum intermedium* exhibited best growth (0.99 OD_{600}) when exposed to 50 ppm and (1.07 OD_{600}) exposed to 100 ppm of chrysene for 7 days respectively. *Enterobacter* sp. exhibited best growth (0.68 OD_{600}) when exposed to 50 ppm and (0.49 OD_{600}) exposed to 100 ppm of chrysene respectively. Above findings conclude that *Ochrobactrum intermedium* is more efficient in chrysene degradation than *Enterobacter* sp. and both the isolated strains were capable of utilizing up to 100 ppm of chrysene in MSM media.

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