

## Manipulation of methane percentage and biogas production efficiency of rice straw biomethanation

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Straw biomethanation has gained popularity among Sri Lankan farmers. However, the technology of straw biomethanation has not yet achieved its full potential production and potential methane percentage.

Experiments were undertaken at the University of Ruhuna, to improve the methane percentage and the biogas production efficiency of rice straw batch biomethanation.

The original rice straw C: N ratio was 80:1 and urea was used (46% nitrogen) to adjust the C: N ratio in between 10:1 to 40:1. After mixing with urea the highest total biogas production of 54.12 liters and maximum methane percentage of 55% were given at 30:1 C: N ratio with 8 days of lag phase. The lowest gas production and minimum methane percentage were taken at 10:1 C: N with 23.59 liters and 18.2%, respectively.

C: P ratios were adjusted using Concentrated Super Phosphate keeping the ratios in between 100:1 to 250:1 while keeping a constant ratio of 30:1 of C: N ratio. The original C: P ratio of rice straw was 331:1. C: P ratio of 200:1 ratio produced the maximum gas yield of 54.99 liters with the 5 days of lag phase. Maximum percentage of methane was also produced at 200:1 while the lowest was given at 100:1 C: P ratio.

Molasses were manipulated as a source of readily available energy and micronutrient source to detect the effect on biogas production and the methane percentage under batch fermentation keeping a constant C: N ratio of 30:1 and C: P ratio 200:1 in all the experiments. Molasses 100 mL was found to be the best maximum yield of 63.13 L and 200 mL did not give any gas. Molasses addition drastically effects to reduce the lag phase up to 3 days with the highest methane percentage of 60% in comparison with molasses free treatments. The quantity of 200 mL did not give any gas and it decreases pH into acidic levels.

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