

## EFFECT OF LIGNIN CONTENT ON BIODEGRADATION OF WATER HYACINTH

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Water hyacinth causes serious problems in natural water sources due to its rapid growth rate and spreading, especially in tropical countries. Several studies have investigated the use of water hyacinth as a potential source for biogas production and composting since it has a Nitrogen content up to 3.2% of dry matter, a C/N ratio around 15, a high content of fermentable matter and essential nutrients. However, these applications require effective biodegradation of water hyacinth, which is often limited by the presence of lignin in its structure. This is because lignin can act as a polymer around the fermentable matter such as hemicelluloses and micro fibrils and prevent them from biological degradation. Hence, the objective of this study was to investigate the effect of lignin content on biodegradation of water hyacinth. Lignin was removed from dried water hyacinth by mixing it with 1.3% (w/w) sulphuric acid and keeping it in the oven at 130 °C for 40 minutes. Thereafter, lignin percentages of raw and lignin removed water hyacinth were determined using the acetyl bromide method and were found to be 15.2% and 10.1%, respectively. Both raw and lignin removed water hyacinth were mixed with cow dung at a ratio of 1:1 (w/w) in separate digesters and water was added to the digesters at a solid to water ratio of 1:9 (w/w). The mixtures were digested at the prescribed temperature and pH for 30 days and their biodegradability was measured based on the amount of gas produced. It was found that the volume of the produced gas from lignin removed water hyacinth and raw water hyacinth were 6.7 L and 5.6 L, respectively which gave 1.1 L more amount of gas from the lignin removed water hyacinth. This shows that biodegradation of lignin removed water hyacinth was significantly higher than that of raw water hyacinth, suggesting that the removal of lignin significantly enhances the biodegradation process. Hence, it is necessary to develop efficient and low-cost methods for the removal of lignin from water hyacinth for its effective utilisation for biogas production and composting.

**Keywords:** Acetyl bromide method, Acid pre-treatment, Biogas, Lignin, Water hyacinth

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