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Integration of *Pleurotus tuoliensis* cultivation and biogas production for utilization of lignocellulosic biomass as well as its benefit evaluation

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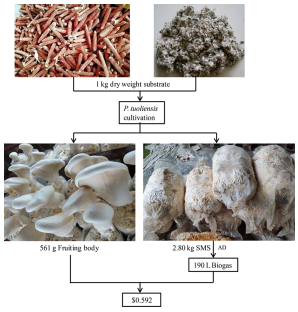
GRAPHICAL ABSTRACT



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ABSTRACT

The present study was to assess the economic benefit of integrated *P. tuoliensis* cultivation and biogas production based on the utilization of lignocellulosic biomass. Among the five evaluated cultivation substrates, that consisting of 55% cottonseed hull, 25% corncob, 10% wheat bran, 5% corn flour, 4% lime, and 1% gypsum was demonstrated to be optimal for the simultaneous production of *P. tuoliensis* mushrooms and biogas fuel. Preliminary estimation shows that, for the consumption of dry substrate per unit mass (calculated in per kg), a total of 561 g fresh mushroom product was harvested and 189.88 L biogas was generated. Accordingly, the production costs were abolished and an economic benefit of approximately $0.592 was obtained, with the high-value mushroom product being the main contributor to profit. Moreover, this integrated process also exhibited positive ecological and social benefits and as such, is worthy of promotion and further application.

1. Introduction

Owing to development of the world economy and increased industrialization, the shortage of fossil fuels is becoming increasingly apparent. Lignocellulosic biomass, rich in organic carbon, is regarded as an ideal renewable alternative to fossil fuels due to its potential for conversion into biofuels (Sivagurunathan et al., 2017) and therefore is of great significance for the sustainable development of human society (Huang et al., 2016).

Lignocellulosic material is abundant and readily available, consisting mainly of cellulose, hemicellulose, and lignin; and its conversion is based on a sugar utilization process, in which cellulose and

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