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Evaluation of the potential conversion of lignin into aromatic molecules by bacterial strains.

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PURPOSE OF THE ABSTRACT

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Faced with the scarcity of fossil resources and climatic change, it becomes essential to find environmental-friendly alternatives to develop sustainable products. Lignin is a renewable source of aromatic molecules. It is present in very large quantities throughout the world in plant biomasses but also as by-products of certain industries (paper industry, wood industry,...). Currently, lignin mainly is used to produce energy and some little valued in molecules of interest because of its complexity1. Lignin can be degraded by biological and enzymatic processes known to be respectful of the environment. The biocatalysts used during these processes are still not very efficient. In nature, several microorganisms are able to degrade lignin2. The use of bacteria can have several advantages: ease of implementation (culture, biomass production,...) ubiquitous in many environments (resistant to extreme conditions, metabolic capabilities, ...), available and efficient genetic tools (many bacteria can be genetically modified to obtain a desired function). However, most of the work in the field of bacterial conversion of lignin concerns model molecules whereas studies on lignins remain rare and do not necessarily reflect their ligninolytic capacities.
Due to the complexity of lignins (structures and chemical composition), it is a need for efficient biological tools to valorize the aromatic moieties of this polymer. Our objective is to identify bacteria efficient in lignin conversion. Our strategy consists in selecting some "ligninolytic" bacteria identified in the literature belonging to various genus. We studied their capacity to use technical lignins by multiple approaches (growth, enzymes production, aromatic molecules and residue analysis). The results showed that the targeted bacteria behave differently in presence of lignin in terms of growth, production of enzymes and phenolic molecules.
In conclusion, efficient use of lignins requires a suitable combination of biocatalysts/lignins. It is necessary to choose biocatalysts according to their metabolic capacities, their complementarity but also considering the structure and composition of the substrates to be valorized.
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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
Bioconversion | Bacteria | Lignin

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