S9-1

Extraction and Application of Bulk Enzymes and Antimicrobial Substance from Spent Mushroom Substrates

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Pleurotus ostreatus, *P. eryngii*, and *Flammulina velutipes* are major edible mushrooms that account for over 89% of total mushroom production in Korea. Recently, *Agrocybe cylindracea*, *Hypsizygus marmoreus,* and *Hericium erinaceu* are increasingly being cultivated in mushroom farms. In Korea , the production of edible mushrooms was estimated to be 614,224 ton in 2013. Generally, about 5 kg of mushroom substrate is needed to produce 1 kg of mushroom, and consequently about 25 million tons of spent mushroom substrate (SMS) is produced each year in Korea. Because this massive amount of SMC is unsuitable for reuse in mushroom production, it is either used as garden fertilizer or deposited in landfills, which pollutes the environment. It is reasonably assumed that SMS includes different secondary metabolites and extracellular enzymes produced from mycelia on substrate. Three major groups of enzymes such as cellulases, xylanases, and lignin degrading enzymes are involved in breaking down mushroom substrates. Cellulase and xylanase have been used as the industrial enzymes involving the saccharification of biomass to produce biofuel. In addition, lignin degrading enzymes such as laccases have been used to decolorize the industrial synthetic dyes and remove environmental pollutions such as phenolic compounds. Basidiomycetes produce a large number of biologically active compounds that show antibacterial, antifungal, antiviral, cytotoxic or hallucinogenic activities. However, most previous researches have focused on therapeutics and less on the control of plant diseases. SMS can be considered as an easily available source of active compounds to protect plants from fungal and bacterial infections, helping alleviate the waste disposal problem in the mushroom industry and creating an environmentally friendly method to reduce plant pathogens. We describe extraction of lignocellulytic enzymes and antimicrobial substance from SMSs of different edible mushrooms and their potential applications.

Reference

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Keyword: antimicrobial activity, lignocellulytic enzymes, spent mushroom substrate

* Aknowlegement: this research is supported by research grant (Agenda project No. PJ009969) from Rural Department Administration, Suwon, Korea.