

Research Title Molecular genetics strain improvement of mushrooms to increase the production by transformation and expression of a cellulase gene

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### Abstract

The cellulose gene, *cbhl-II*, was cloned from straw mushroom, *Volvariella volvacea*, and ligated into the expression vector under the control of the glyceraldehydes triphosphate dehydrogenase (gpd) promoter of shiitake mushroom, *Lentinula edodes*. The resulting plasmid was transformed into tissues of straw mushroom by using *Agrobacterium*-mediated transformation method. As found in this study, the transformation efficiency was 10% and 5 transformants were achieved. Although all transformants could grow in selective medium, foreign DNA was not found when verify by PCR. This indicated that the transformants grew in selective medium were false positive. The cellulose gene, *PEcbh*, was cloned from king oyster mushroom, *Pleurotus eryngii*, using RT-PCR, 5' and 3'RACE techniques. The *PEcbh* was 1,377 bp and the deduced protein consisted of 458 amino acid residues with the predicted molecular mass of 49.5 kDa and showed similarity to cellulase of several mushrooms and fungal species. The *PEcbh* was constructed downstream of the gpd promoter of shiitake mushroom and transformed into tissues of king oyster mushroom by using *Agrobacterium*-mediated transformation technique. Transformation efficiency was 8% and 4 transformants were obtained. Comparative study on mushroom production between wild type (WTPE) and transformants (TPE1-4) was performed in laboratory scale, and the results revealed that TPE1 and TPE2 gave lower production yield than WTPE while that of TPE3 was almost similar to that of WTPE. However, the production yield of TPE4 was approximately 1.4-fold significantly higher than that of WTPE.

Key words: *Volvariella volvacea*, *Pleurotus eryngii*, cellulase, glyceraldehydes triphosphate dehydrogenase, *Agrobacterium*-mediated transformation