Expressing *mgs* and *dhaD* genes in *Saccharomyces cerevisiae* strain to produce 1,2-propanediol and optimizing fermentation

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The main goal of this research is to achieve a more efficient production of 1,2-propanediol (1,2-PD) using developed *Saccharomyces cerevisiae*. 1,2-propanediol (1,2-PD) cannot be produced by wild type *Saccharomyces cerevisiae* so in order to develop a *Saccharomyces cerevisiae* mutant which can produce 1,2-PD, *mgs* gene of *E. coli*-K12 MG1655 and *dhaD* gene of *Citrobacter freundii* were inserted into yeast expression vectors and transformed into the wild type of *Saccharomyces cerevisiae*. As a result, the batch fermentation of *S. cerevisiae* YPH500, harboring a *mgs* gene inserted pJES27 vector, resulted in a yield of 0.17g/L. On the other hand, the methylglyoxal synthase of the recombinant *S. cerevisiae* YPH500, harboring a *dhaD* gene inserted pJES29 vector, was inactivated and produced no detectable amount of 1,2-PD. Therefore in order to achieve a maximum yield of 1,2-PD we selected the pESC-TRP vector which is able to co-express several gene. By inserting the *dhaD* gene into pESC-TRP vector, pJES30 vector was constructed. The maximal yield of 1,2-PD achieved in the 1% galactose batch fermentation by pJES27 and pJES30 harboring *S. cerevisiae* was 0.45g/L.