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Improvement of *Penicillum oxalicum* cellulase production via reconstruction of expression regulation network (RERN)

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Cellulolytic fungi *Penicillium oxalicum* produces diverse lignocellulolytic enzymes, and has been shown to be a promising cellulase producer. Given the dose-controlled or additive regulation of cellulase genes by the master regulator ClrB presented in *P. oxalicum,* and the synergistic transcriptional induction of cellulolytic genes in Bgl2-deficient background, we constructed two overexpression cassettes *gpdA(p)::clrB::ΔcreA-ptra* and *PDE_02864(p)::clrB::Δbgl2-bar*, in which the *clrB* overexpression cassettes confer *creA* or *bgl2* flanking regions, respectively. These overexpression cassettes for *clrB* were transformed sequentially into the *pyrG* mutant of *P. oxalicum* strain M12. The double mutant MRE1 *(gpdA(p)::clrB::ΔcreA)* and the quadruple mutant MRE2 *(gpdA(p)::clrB::ΔcreA-PDE_02864(p)::clrB::Δbgl2)* were obtained, respectively and their cellulase expression abilities were separately evaluated on cellulose and wheat bran media. Although all these experiments were performed in flasks, both MRE1 and MRE2 mutants showed more cellulolytic and xylanolytic enzyme activities and secretion abilities than parental strain M12. We also observed a significant increase in the strain bearing the $XlnR^{A871V}$ allele (alanine-to-valine mutation) under cellulose conditions relative to the parental wild type strain 114-2. Thus, the overexpression cassette carrying PDE_02864-driven $XlnR^{A871V}$ using *pyrG* as selective marker was reconstructed and transformed into quadruple mutant MRE2, and might be feasible in further enhancing the cellulase expression. These data signify that the dose-controlled regulation mechanisms of the cellulolytic regulators are a promising strategy for cellulolytic fungi to develop enzyme hyper-producers via the reconstruction of expression regulation network (RERN) technology.

Biography

Xin Song has completed his PhD from Shandong University and Post-doctoral studies from Inha University School of Biological Engineering. He is the Professor of School of Life Science, Shandong University. He has published more than 30 papers in reputed journals and has 12 authorized patents.

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