Qualification of cotton scouring by β-glycosidase-CBD fusion protein

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Hybrid proteins, consisting of indigo-developing enzyme on N-terminal and cellulose binding domain (CBD) on C-terminal, were constructed for rapid qualification of scouring efficiency of cotton fabrics. CBD leads the protein on to cellulose fibers and resultantly the enzyme produces indigo on the surface of cotton fabrics when X-gal is supplied as a substrate. β-Glycosidase (bglA) of *Thermus caldophilus*, β-glucuronidase (GUS) of *Escherichia coli* , green fluorescent protein (GFP), and or red fluorescent protein (DsRed) was tested as a reporter domain of the hybrid while all CBDs was that from *Cellulomonas fimi* exoglucanase. Among the resulted hybrid proteins, bglA-CBD was selected as the best by one hundred fold higher activity compared to the GUS hybrid and by the thermostability up to 80℃. The GUS hybrid was partly insoluble and aggregated gradually during the purification. Those with GFP and DsRed were nearly insoluble and were not subjected to further examinations. Whenthe bglA-CBD reporter hybrids were applied to cotton samples of different scouring level and incubated with X-gal, indigo colors developed within 2 hours. The difference in color depth was measurable in quantitative manner depending on the scouring extent.

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