Detection of toxic lignin hydrolysate-related compounds using an inaA::luxCDABE fusion strain

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In this study, we constructed a fusion strain, SP4, which has *inaA::luxCDABE*, based upon real-time quantitative PCR analysis when *E. coli* BL21(DE3) was exposed to ferulic acid and coumaric acid. To characterize this strain, we observed the responses to various concentrations of ferulic acid and compared inaA expression levels with many other compounds identified within hydrolysates. From the tests, it was shown that the aromatic acids and aldehydes caused induction of *inaA* expression while acetic acid and furfural did not affect the *inaA* expression. Also, we transformed the plasmid into several *E. coli* strains and *mar* mutant strains and monitored the responses from them, in order to see the effects from the difference of genetic backgrounds. Even though the induction level of *marA*- strain was lower than that of *marA*+ strain, the *marA*- strain still showed significant induction, suggesting some other regulatory mechanisms for *inaA* expression. Finally, we applied this biosensor to test actual hydrolysate samples and monitor the degradation of benzoate.