Analysis of lignin-hydrolysates by E.coli biosensor for alternative source of renewable energy

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In this study, we used toxicogenomic data to select genes that were perturbed during an exposure to hydrolysate-related compounds. Using the microarray and RT-qPCR results, we constructed new bioluminescent plasmids and Escherichia coli strains containing the genes sensitive to ferulic acid. In subsequent exposure tests, the change in the bioluminescent emission was monitored when these strains were exposed to several hydrolysate-related chemicals. It was found that the inaA::lux fusion strain, SP4, was induced ~30-fold, demonstrating that this gene can be used to test for the presence of ferulic acid and other hydrolysate-related chemicals. Furthermore, another bioluminescent strain (zwf::lux) that is also induced by the same chemicals was also tested and the results compared with those from SP4. Also, mRNA was purified from the bacterial culture during the exposure to each of the chemicals tested and used to generate cDNA for RT-qPCR tests. Finally, the results from the RT-qPCR experiments were compared with the bioluminescence data to demonstrate that the bioluminescent data is consistent with changes in the transcriptional levels.