Setting-up a fast and reliable cytokinin biosensor based on a plant histidine kinase receptor expressed in Saccharomyces cerevisiae

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Résumé en anglais	Cytokinins (CK) have been extensively studied for their roles in plant development. Recently, they also appeared to ensure crucial functions in the pathogenicity of some bacterial and fungal plant pathogens. Thus, identifying cytokinin-producing pathogens is a prerequisite to gain a better understanding of their role in pathogenicity. Taking advantage of the cytokinin perception properties of Malus domestica CHASE Histidine Kinase receptor 2 (MdCHK2), we thereby developed a selective and highly sensitive yeast biosensor for the application of cytokinin detection in bacterial samples. The biosensor is based on the mutated sln1Δ Saccharomyces cerevisiae strain expressing MdCHK2. The biosensor does not require any extraction or purification steps of biological samples, enabling cytokinin analysis directly from crude bacterial supernatants. For the first time, the production of cytokinin was shown in the well-known plant pathogenic bacteria Erwinia amylovora and was also revealed in human pathogens Staphylococcus aureus and Streptococcus agalactiae. Importantly, this biosensor was shown to be an efficient tool for unraveling certain steps in cytokinin biosynthesis by micro-organisms since this it was successfully used to unveil the role of ygdH22, a LOG-like gene, that is probably involved in cytokinin biosynthesis pathway in Escherichia coli. Overall, we demonstrated that our biosensor displays several advantages including time- and cost-effectiveness by allowing a rapid and specific detection of cytokinins in bacterial supernatants These results also support its scalability to high-throughput formats.
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