S6.3 Impact of rhizobacterial volatiles on *Brachypodium distachyon* (L.) Beauv. growth and response to abiotic stresses.

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Abstract

Plant growth-promoting rhizobacteria (PGPR) show a great potential of enhancing plant growth by several mechanisms. Among them, the emission of volatile organic compounds (VOCs) and their biological roles in plants remain to be thoroughly understood. In this context, the VOC-mediated interaction between *Brachypodium distachyon* Bd21 and nineteen bacterial strains was assessed for potential growth-promotion effects. The impacts of bacterial VOCs on Bd21 development was studied using an *in vitro* cocultivation system without physical contact between the bacterial strains and the plant. The results show that some bacterial strains modulate total biomass production, biomass allocation and root architecture in Bd21. The statistical analysis of these biological effects allowed us to select two bacterial strains with strong growth promotion activity: *Enterobacter cloaceae* JM22 and *Bacillus subtilis* GB03. In a first experiment, GB03 VOCs showed potential regulation of the expression of some microRNAs implicated in root development, cold stress response and phosphate starvation response in Bd21 grown *in vitro* during ten days. Complementarily, an *ex vitro* cocultivation system was developed in order to (1) confirm the *in vitro* screening results, (2) study older developmental stages in a more realistic way and (3) assess the effects of bacterial VOCs in an abiotic stress context. This system will be used to unravel the VOC-mediated communication in the context of drought tolerance and phosphate starvation response.

Keywords
Plant growth-promoting rhizobacteria, *Brachypodium distachyon* Bd21, volatile organic compounds, drought stress, phosphate starvation, root architecture, microRNA