Abstract

Burkholderia kururiensis is a diazotrophic bacterium originally isolated from a polluted aquifer environment and presents a high level of similarity with the rice endophyte "B. brasiliensis" species. This work assessed the ability of B. kururiensis to endophytically colonize rice plantlets by monitoring different tissues of root-inoculated plants for the presence of bacterial growth in different media, electron microscopy and by 16S rDNA analysis. Observations of roots, stems and leaves of inoculated rice plantlets by electron microscopy revealed B. kururiensis colonization predominantly on root hair zones, demonstrating endophytic colonization primarily through the endodermis, followed by spreading into xylem vessels, a possible pathway leading to aerial parts. Although indifferent for the bacterial growth itself, addition of a nitrogen source was a limiting factor for endophytic colonization. As endophytic colonization was directly associated to an enhanced plant development, production of phytohormone auxin/indole-3-acetic acid by B. kururiensis was assayed with transgenic rice plantlets containing an auxin-responsive reporter (DR5-GUS). Our findings suggest the ability of auxin production by plant-associated B. kururiensis which may have a stimulatory effect on plant development, as evidenced by activation of DR5-GUS. We hereby demonstrate, for the first time, the ability of B. kururiensis to endophytically colonize rice, promoting both plant growth and rice grain yield.

Keywords

Burkholderia kururiensis, colonization, rice, diazotrophic bacterium, auxin.