

A carotenoid-deficient mutant in *Pantoea* sp. YR343, a bacteria isolated from the rhizosphere of *Populus deltoides*, is defective in root colonization

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Background

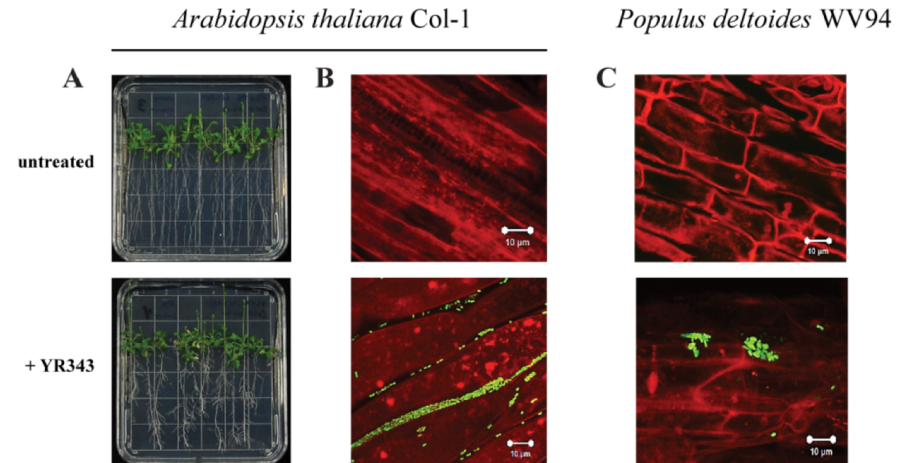
- The rhizosphere is the site of a complex network of microbe-microbe interactions that promote plant growth via phytohormone production, nitrogen fixation, and enhanced water and mineral uptake.
- Carotenoids are known to play a role in protection against reactive oxygen species, which is a common plant defense compound produced during colonization.
- Pantoea* sp. YR343, isolated from the rhizosphere of *Populus deltoides*, and a robust colonizer of plant roots, can help to understand the molecular mechanisms involved in rhizosphere survival and plant association.

Science

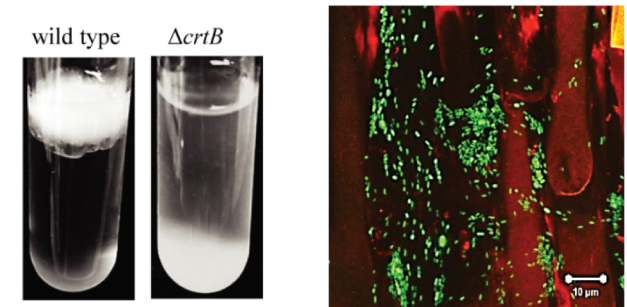
- A carotenoid-deficient mutant was generated in *Pantoea* sp. YR343 by deleting the phytoene synthase gene, *crtB*.
- The $\Delta crtB$ mutant was compared to the wild type to examine how carotenoids are important to the lifestyle of *Pantoea* sp. YR343.
- The $\Delta crtB$ mutant was more sensitive to H_2O_2 as expected, but surprisingly, it was also defective in root colonization, biofilm formation and auxin biosynthesis in comparison to the wild type.

Significance

- We hypothesize that these functional changes are likely due to perturbations in membrane organization due to loss of the carotenoid, zeaxanthin.
- This study is the first to show a role for bacterial carotenoids in root colonization.



Colonization of plant roots by *Pantoea* sp. YR343.



Loss of carotenoids affects biofilm formation and root colonization. Left: Pellicle formation Right: Images of wheat roots treated with YR343-GFP (green) and the mutant $\Delta crtB$ (red).

Bible AN *et al.* (2016) A carotenoid-deficient mutant in *Pantoea* sp. YR343, a bacteria isolated from the rhizosphere of *Populus deltoides*, is defective in root colonization. *Frontiers in Microbiology* 7:491 doi:10.3389/fmicb.2016.00491