

## **The use of the ACC deaminase producing bacterium *Pseudomonas putida* UW4 as a biocontrol agent for pine wilt disease**

El uso de la bacteria productora de ACC deaminase *Pseudomonas putida* UW4 como un agente de biocontrol para la enfermedad de marchitamiento de los pinos

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Pine wilt disease, caused by the nematode *Bursaphelenchus xylophilus*, is responsible for the devastation of worldwide pine forestlands. Until today, the only effective solution to this serious threat resides on the destruction of infected trees, which is both economic and ecologically unacceptable. The use of ACC deaminase-producing plant growth promoting bacteria has been shown to be a useful strategy in order to reduce biotic and abiotic constraints that affect plant health and development. In this sense, we report the use of the ACC deaminase-producing bacterium *Pseudomonas putida* UW4 as a potential biological control agent for pine wilt disease. An inoculation assay was performed in 3-4 months *Pinus pinaster* (maritime pine) seedlings obtained from a nursery in Portugal. The bacteria *P. putida* UW4 wild-type and ACC deaminase mutant strains were inoculated in the roots of pine seedlings followed by stem inoculation of *B. xylophilus*. The inoculation of the *P. putida* UW4 wild-type strain lead to a significant reduction of *B. xylophilus* induced symptoms. Moreover, regardless the inoculation with *B. xylophilus*, seedlings inoculated with *P. putida* UW4 also demonstrated an increased root and shoot development. In addition, *P. putida* UW4 ACC deaminase knockout mutant was unable to promote pine seedling growth or to decrease *B. xylophilus* induced symptoms. The results obtained indicate that the inoculation of ACC deaminase-producing bacteria in pine seedlings growing in a nursery system might constitute a novel strategy to obtain *B. xylophilus* resistant pine trees. This is the first report on the use of ACC deaminase-producing bacteria as potential biological control agents for tree diseases.