

**Title** Increasing survival and efficacy of biological control agents by means of hyperosmotic adaptation

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#### **Abstract**

The efficacy of biological control agents depends on the colonization of plant surfaces after application. A procedure to increase survival under water stress limitation has been developed consisting of saline stress and osmolyte amendment to the growth medium during inoculum preparation. The procedure was tested in the biocontrol agent of postharvest fungal diseases *Pantoea agglomerans* EPS125 and in the biocontrol agent of fire blight *Pseudomonas fluorescens* EPS62e. Hyperosmotic stress induced the synthesis and intracellular accumulation of compatible osmolytes but decreased growth significantly. Amendment of the saline medium with glycine betaine restored growth and promoted its intracellular accumulation. Osmoadaptation of *P. agglomerans* EPS125 increased considerably its survival on apple fruit surfaces under low relative humidity (RH) conditions and significantly improved blue mould control under conditions where the standard biological control treatments were ineffective. Osmoadaptation of *P. fluorescens* EPS62e increased cell survival on plant surfaces by 10 to 100-fold under low RH controlled conditions. In the field, cell survival increased 100 to 1000 times in immature fruit upon osmoadaptation but was not significantly affected in flowers. The efficacy of control of fire blight infections upon osmoadaptation was increased 30 to 50 % on immature fruits but was not affected in blossoms. The implications of the method for increasing epiphytic fitness and the efficacy in other biological control agents of plant pathogens are discussed.