

Title Improving the efficacy of postharvest biocontrol agents - production of environmental stress tolerant formulations

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Abstract

The limited tolerance of many biocontrol agents to fluctuating environmental conditions and the difficulty of developing a shelf-stable formulated product able to resist these stress conditions (low water activity and high temperatures) and still be as effective as fresh cells is one of the main reasons for the limited commercial availability of biocontrol agents (BCAs). Thus, improvement in the stress tolerance of BCAs during production, that can lead to better survival and activity under suboptimal environmental conditions, is an important challenge.

In general, microorganisms are able to survive environmental stress by the induction of specific or general protection systems, such as cytoplasmic accumulation of endogenous reserves (compatible solutes) or heat shock protein biosynthesis. Subjection to a mild stress can make cells resistant to a subsequent lethal challenge of the same stress and can also render cells resistant to other stress conditions (cross protection). This natural capacity has been used during formulation of BCAs to improve their stress tolerance when they are later used in a commercial application.

Research studies directed at improving *Candida sake* CPA-1 and *Pantoea agglomerans* CPA-2 (well-known postharvest BCAs) stress tolerance have been conducted. Results have been achieved that improve their tolerance to osmotic, thermal and pH stresses. The use of stress-adapted formulations of BCAs has resulted in enhanced biocontrol efficacy under field conditions and broadened their spectrum of action.