

**Title** Commercialization of postharvest biocontrol: Barriers and opportunities  
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**Citation** Abstracts Book, 6<sup>th</sup> International Postharvest symposium, 8-12 April 2009, Antalya, Turkey.  
256 pages.  
**Keyword** Biocontrol; barrier; moleccular

### **Abstract**

The past twenty years has seen the field of postharvest biocontrol evolve from an unknown entity with one or two novel report in the literature to a sophisticated science with strong research programs worldwide, hundreds of publications, patented technologies, and now several commercial products. Despite this rapid progress, however, the use of these products and both our fundamental and applied knowledge of postharvest biocontrol remain limited. The practical application of postharvest biocontrol has slowly changed its paradigm from a very classical view of using one organism to control another organism to a broader, more integrated outlook where antagonists are combined with natural products, physical treatments, and pre- as well as postharvest applications in order to enhance the efficacy and reliability of using microbial antagonists. These integrated approaches offer the potential of helping to overcome problems related to the performance and use of postharvest biocontrol agents, however, these integrated approaches need to be standardized if they are to be readily adopted by the industry. More research is needed in many, aspects of the science and technology of postharvest biocontrol in order to integrate biocontrol agents into a combined pre- and postharvest production and handling system. The tools of molecular biology, such as genome sequences, microarrays, and genetic transformation now provide the ability to develop a better understanding of the mode of action of postharvest biocontrol agents as part of a tritrophic interaction between the host, antagonist, and pathogen. From an industrial viewpoint, knowledge regarding the short and long term effects of fermentation and packaging technologies on efficacy is still very rudimentary. These topics will be reviewed in the context of elucidating the barriers that need to be overcome for the widespread commercialization of postharvest biocontrol agents and outlining future research directions that will provide new opportunities for developing alternative methods of postharvest disease control.