

Title Biological control of pre- and postharvest diseases in mango
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Abstract

The growing global demand for fresh tropical and subtropical fruit of high quality and without pesticide residues necessitates the development of alternative approaches to disease control. As it is highly perishable, mango fruit destined for export is subject to various pre- and postharvest diseases. These pathogens can currently be effectively controlled with fungicides, but new pesticide legislation in developed countries has forced industry particularly in developing countries to evaluate alternative products. The antagonist *Bacillus licheniformis* has been shown to effectively control the mango preharvest pathogens *Xanthomonas campestris* pv. *mangiferaeindicae* and *Colletotrichum gloeosporioides*, causing mango bacterial black spot and anthracnose respectively. The antagonist was most effective when applied in integrated field sprays, and showed some potential disease control, as well as decreased sunburn, when applied to a plastic cap with a woolly base covering the fruit. The postharvest diseases soft brown rot (*Botryosphaeria* spp.) and anthracnose could also be controlled in commercial packhouse dip treatments or when applied in an integrated program as a wax-based product. Several modes of action have been shown for the antagonist when tested against the various pathogens, such as competition for nutrients and space, and production of lipopeptides belonging to the fengycin and surfactin families. Additional molecular and electron microscopic studies confirmed the strain identity and antagonist-pathogen interaction on the host surface. The general viability of biocontrol systems and efficacy for export consignments are discussed.