Title	Vanillin inhibits pathogenic and spoilage microorganisms in vitro and aerobic microbial growth in fresh-cut apples
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Abstract

The antimicrobial effect of vanillin against four pathogenic or indicator organisms; *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, and *Salmonella enterica* subsp. *enterica* serovar Newport and four spoilage organisms; *Candida albicans*, *Lactobacillus casei*, *Penicillum expansum*, and *Saccharomyces cerevisiae* that could be associated with contaminated fresh-cut produce, was examined. The minimal inhibitory concentration (MIC) of vanillin was dependent upon the microorganism and this ranged between 6 and 18 mM. When incorporated with a commercial anti-browning dipping solution (calcium ascorbate, NatureSeal™), 12 mM vanillin inhibited the total aerobic microbial growth by 37% and 66% in fresh-cut 'Empire' and 'Crispin' apples, respectively, during storage at 4 °C for 19 days. Vanillin (12 mM) did not influence the control of enzymatic browning and softening by NatureSeal. These results provide a new insight for vanillin as a potential antimicrobial agent for refrigerated fresh-cut fruits and vegetables.