

# Thermal inactivation of *Alicyclobacillus acidoterrestris* spores in fruit product processing

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## Abstract

*Alicyclobacillus acidoterrestris* spores were recently proposed to be used as design criterion for thermal processes of acid fruit products. This microorganism has been found in commercial pasteurized acid fruit juices, such as orange and apple. Although being non-pathogenic and not easy to detect visually, it is responsible for off-flavours development. On the other hand, the first thermal inactivation kinetic studies confirmed that these spores are much more resistant than the usual spoilage microorganisms in acid foods. Therefore, in 2000 it was firstly proposed to be used in the design of hot-filling and continuous pasteurization conditions of a tropical fruit pulp and juice, respectively.

This work presents a critical review on inactivation kinetics of *Alicyclobacillus acidoterrestris* spores. The available studies were obtained under thermal treatments, and studied the effects of temperature, pH and soluble solids. Those effects were quantified in terms of decimal reduction time (first order model) and z-values (Bigelow model). Furthermore, they were obtained under isothermal conditions.

Future challenges in this field are to quantify the inactivation kinetics behaviour under dynamic conditions, using thermal and non-thermal treatments, such as ozonation, ultrasonication or high pressure. These alternative treatments have the advantage of minimizing quality attributes degradation and improving products. Moreover, predictive microbiology skills are suggested as a valuable tool for process design and optimization.

**Keywords:** *Alicyclobacillus acidoterrestris* spores, fruit products, process design criterion, thermal processing, alternative non-thermal treatments, predictive microbiology