TITLE: MATHEMATICAL MODELING: EFFECT OF pH on the thermal resistance of *Alicyclobacillus acidoterrestris* IN DIFFERENT TROPICAL FRUIT JUICES

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ABSTRACT:
The deterioration and reduced shelf life of fruit juices cause economic losses in the food industry and bacteria of the genus *Alicyclobacillus* are often associated with this deterioration. *A. acidoterrestris* is a thermoacidophilic, spore-forming bacterium that is able to withstand all stages of industrial juice processing and effective strategies are needed to inactivate endospores. Given the economic losses caused to the food industry, new alternatives and some chemical and physical strategies have been investigated to inhibit the germination of endospores and prevent the vegetative growth of *Alicyclobacillus* cells. Because of the high thermal resistance of endospores and the fact that thermal treatments using high temperatures can alter the organoleptic properties of foods, combinations of methods have been examined to improve the efficiency of thermal processing.This study aimed to evaluate the effects of different pH and temperatures on the thermal resistance of *A. acidoterrestris* endospores in tropical fruit juices. Commercial juices of pineapple, guava, orange, papaya, mango and passion fruit at pH 2.5, 3.0, 3.3, 3.6, 4.0 and 4.5 were used. Endospore thermal death curves were obtained at temperatures of 90 and 95 ° C for 25 min with samples collected at interval of 5 min. From the death curves, the decimal reduction times (D-value and z) were calculated. The mathematical models, Peretto graph and response surface graphs were created from SAS System 9.0 software using the Regression model in Log. Adjusted mathematical model was proposed for each juice evaluated and were used to evaluate the interactions with greater impact in the thermal resistance. The highest D values were found in passion fruit and orange at pH 4.5 (D90 °C) and pineapple and orange juices at pH 4.5 (D95 °C), while the lowest values were obtained in papaya juice at pH 2.5. The pH had little effect on thermal resistance in treatments performed at 95 °C. Guava juice exhibited the best goodness of fit (R^2 = 0.94) for LogD values in the regression model, while papaya juice had the lowest coefficient of determination (R^2 = 0.83). Among the effects analyzed using mathematical models, the interaction between pH x temperature had the greatest impact on thermal reduction of *A. acidoterrestris* endospores. Defining the optimal conditions for thermal treatment of tropical fruit juices can help prevent the spoilage by *A. acidoterrestris*.

Keywords: thermoacidophilic bacteria, spoilage, inactivation model
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