

## Joint effect of heat, pH and grape extract on *Bacillus cereus* spores survival in a precooked rice matrix

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Rice is one of the most important cereals in the worldwide and it is the staple food in many countries; however, its high carbohydrate content makes it an excellent medium to *Bacillus cereus* growth. Its spores are resistant to traditional cooking treatments and if there is no adequate post-cooking storage, it can germinate and growth representing a high risk to consumer health. Natural antimicrobials have gained popularity as hurdle technologies when combined with heat. The objective of this study was to determine the antimicrobial activity of grape extract against *B. cereus* spores in a cooked rice matrix. The study was carried out by comparing a control sample and a sample with grape extract, in both cases, the solutions were adjusted to different pH levels (4.5-5.5-6.5) and were treated at different temperatures including those used in conventional cooking process of rice (90, 95, 100 and 105°C). The survivor data obtained were fitted to the Bigelow and Weibull models; it was found that the best fitting model was the Weibull function distribution. From that, the values of *a* and *b* parameters were determined. With these data, an ANOVA analysis of variance was performed and showed that the grape extract had an antimicrobial activity at 90 and 95°C reaching the greater logarithmic reductions when combined with acid pH. The results show the capacity and usefulness of a by-product of the agri-food industry, such as grape extract, to improve the food safety of rice products, especially when combined with mild thermal treatments.

Keywords: *Bacillus cereus*, Grape extract, Antimicrobial effect, Rice, Food safety