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Optimising the inactivation of grape juice spoilage organisms by pulse electric fields.

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Abstract

The effect of some pulsed electric field (PEF) processing parameters (electric field strength, pulse frequency and treatment time), on a mixture of microorganisms (*Kloeckera apiculata*, *Saccharomyces cerevisiae*, *Lactobacillus plantarum*, *Lactobacillus hilgardii* and *Gluconobacter oxydans*) typically present in grape juice and wine were evaluated. An experimental design based on response surface methodology (RSM) was used and results were also compared with those of a factorially designed experiment. The relationship between the levels of inactivation of microorganisms and the energy applied to the grape juice was analysed. Yeast and bacteria were inactivated by the PEF treatments, with reductions that ranged from 2.24 to 3.94 log units. All PEF parameters affected microbial inactivation. Optimal inactivation of the mixture of spoilage microorganisms was predicted by the RSM models at 35.0 kV cm⁽⁻¹⁾ with 303 Hz pulse width for 1 ms. Inactivation was greater for yeasts than for bacteria, as was predicted by the RSM. The maximum efficacy of the PEF treatment for inactivation of microorganisms in grape juice was observed around 1500 MJ L⁽⁻¹⁾ for all the microorganisms investigated. The RSM could be used in the fruit juice industry to optimise the inactivation of spoilage microorganisms by PEF