

## PEF assisted thermal inactivation of *Bacillus coagulans* in peach puree Process optimization

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### **Objective**

*Bacillus coagulans* is a heat resistant bacterium of significant concern for acid processed foods. It is responsible for causing "flat sour" spoilage in canned vegetables and fruit products (pH-value<4.2), due to the production of lactic acid. Thus, its inactivation is a key safety target for the relevant industries. The application of pulsed electric fields (PEF) in combination with heat has been already recommended as a new non-thermal pasteurization method of fruit juices, since it enables spore inactivation with lower heat load compared to the conventional thermal processes, while minimally affecting the quality of final products.

The efficacy of combined PEF treatment with heat was evaluated for the inactivation of *Bacillus coagulans* spores in peach puree.

### **Methods**

*Bacillus coagulans* (provided by Greek leader company in fruit concentrates production) (107 CFU/mL) were suspended in sterile distilled water and in peach puree (pH equal to 3.7). The samples were subjected to different PEF (2-10 kV/cm, 0.01- 1 s, 50 Hz, 10 µs pulse width) process conditions under various preheating temperatures (<30, 55, 65 and 75 °C). PEF process conditions were evaluated in terms of their effectiveness in inactivating *B. coagulans* at as low temperatures as possible. Process optimization was also conducted using appropriate empirical mathematical equations. Selected quality parameters of PEF treated samples such as Brix, pH, color, viscosity and sensory evaluation were also studied in comparison to only heat-treated samples.

### **Results**

PEF treatment at preheating temperatures below 30 °C showed no significant inactivation for *B. coagulans* in both media. More intense PEF conditions resulted also to quality degradation of the peach puree. Inactivation of all cells was observed at temperatures 75 °C and 10 kV/cm. No effect was observed in the cells inactivation for the only heat treatment at the same temperature.

### **Conclusions**

The results obtained show that PEF-assisted heat pasteurization at selected conditions could be applied for the production of purees free from *B. coagulans* cells, positively affecting the shelf life and quality of the products.