

Low temperature pasteurization of high nutritional food products

In the Supercritical Lab we study the potential of supercritical CO₂ as alternative technology for the preservation of high value food product. Thermal pasteurization is commonly used to increase the shelf life of food, however the high temperatures cause a decrease of the product quality in terms of nutritional and sensorial aspects. High pressure CO₂ can be used as alternative to pasteurize the food at low temperature. CO₂ at the supercritical state has bactericidal property that allows to inactivate spoilage and pathogenic microorganisms. The low process temperatures (< 45 °C) maintain the chemical-nutritive properties of the raw product making it suitable to produce high value products. The process can be combined with high-power ultrasounds, leading to a synergistic effect on the inactivation of microorganisms. We are currently working on the low temperature pasteurization of pomegranate juice. The high antioxidant activity of pomegranate juice gives it anti-inflammatory, antiviral and anticancer properties. We have optimized the process parameters (temperature, time and pressure) necessary to obtain a total inactivation of the natural present microorganism in the pomegranate juice. Chemical and nutritional analyses have shown a maintenance of the polyphenolic content and antioxidant activity after the supercritical process.

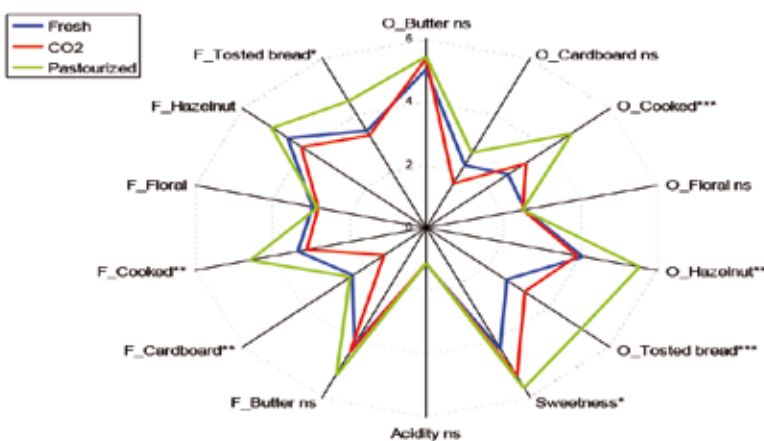


Figure 1. Spider plot for the sensorial attribute of an high nutritional juice: comparison between untreated, thermal pasteurized and CO₂ pasteurized juice. For each sensory attribute the name (O: odor; F: flavor) and its significance are reported (ns: not significant at 5%; *: 5%; **: 1%; ***: 0.1%).

Research topic:

Industrial processes and products

DII research group

Supercritical Group



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Main research topics

- Optimization of high pressure CO₂ process for low temperature food pasteurization
- Effect of the combined process of supercritical CO₂ and high power ultrasounds
- High pressure CO₂ process for food drying
- Batch and continuous pasteurization/drying of solid food products
- Investigation of CO₂ microbial inactivation mechanism
- In situ and on-line analysis of food quality under CO₂ pressure
- Microbial analysis of food products after pasteurization treatment