

The research of this doctoral thesis has focused on the obtaining of new ingredients, rich in bioactive compounds using plant tissues (**persimmon** and **sweet pepper**) subjected to different preservation treatments such as high hydrostatic pressure (HHP) and pasteurization. The main aim of this thesis was to formulate new functional foods.

The effect of specific HHP (200 MPa/6 min/25 °C) and pasteurization (70 °C/15min) treatments on structure and content of some bioactive compounds of **persimmon** was studied. Both HHP and pasteurization treatments caused structural changes in the parenchymal tissue, as well as precipitation of tannins and formation of tannin cells, which could be related to the loss of astringency in **persimmon**. HHP processing improved the extraction of carotenoids and maintained the antioxidant properties of the fruit. HHP technique could be an alternative to pasteurization. HHP-treated persimmon could be used in the formulation of new functional foods such as milk-based beverages enriched with **persimmon**.

The new milk-based beverages, with the same carotenoid content, were formulated using untreated **persimmon**, HHP-treated **persimmon** and pasteurized **persimmon**, and three different milk matrixes: whole milk, semi-skimmed milk, and skimmed milk. Milk-based beverages elaborated using HHP-treated **persimmon** presented the best rheological properties because unlike the untreated and pasteurized **persimmon** milk-based beverages, they did not form a gel-like structure or separate out. Consumers perceived **persimmon** beverages as high antioxidant foods. The beverages with HHP-treated **persimmon**, regardless the type of milk, and the ones enriched with untreated **persimmon** and whole milk were the consumers' favourites. Therefore, HHP treatment could be an ideal method for the formulation of milk-based persimmon beverages with high nutritional value, variable fat content and high acceptability, regardless the seasonality of the fruit.

The location and content of some bioactive compounds and the analysis of some physicochemical properties were carried-out in three different **sweet pepper** types: red, green and yellow. The content of bioactive compounds in each type of **sweet pepper** was conditioned by their structure. **Red peppers** could be suitable for obtaining extracts rich in carotenoids, while **yellow peppers** would provide extracts rich in phenolic compounds with high antioxidant activity. Regarding extracts with high dietary fibre content, **green peppers** would be the most suitable ones.

## Abstract

The effect of different HHP (100, 200, 300 and 500 MPa/15 min/25 °C) and pasteurization (70 °C/10 min) treatments on structure, some bioactive compounds content and texture of **red sweet pepper** was studied. Both HHP and pasteurization treatments caused structural modifications in **red sweet pepper** tissue. However, HHP at 500 MPa and pasteurization were the treatments with least impact on the microstructure. These same treatments were also the ones with least effect on bioactive compound content and texture of **red sweet pepper**. HHP treatment could be an alternative to pasteurization for sweet pepper preservation, since the texture properties and bioactive compound content were found to be similar. New functional foods could be developed using **red sweet pepper** tissues treated with HHP at 500 MPa or pasteurization as well.

Microstructural alterations in **red sweet pepper** tissues caused by HHP and pasteurization led to variations in the morphometric and texture image parameters. Fractal dimension texture, contrast, inverse difference moment and entropy were suitable texture parameters for characterizing the effect of HHP and pasteurization on **red sweet pepper** texture. Cellular damage was best observed at low magnifications.

In order to formulate new white sauces enriched with **red sweet pepper**, two different types of waxy starch (native and modified) at two different concentrations (4 and 6 g/100 g) and different amounts of **sweet pepper** (0, 5, and 15 g/100 g) were used. Rheological properties, microstructure, and sensory characteristics were studied. The effect of incorporating **sweet pepper** on the rheological properties depended upon the type of starch used. The sauces exhibited considerable intrinsic auto-fluorescence due to the presence of carotenoids from the **sweet pepper**. The sauces prepared with modified starch, which were creamier and more consistent, were the most liked. Consumers also found these sauces beneficial for health because red pepper provides antioxidants and nutritional value and improves the sauces' taste. Therefore, novel, functional, and creamy white sauces with high nutritional value, high acceptability, good rheological properties and stability could be formulated using sweet pepper and modified starch.