EFFECT OF HIGH PRESSURE PROCESSING ON THE OSMOTIC DEHYDRATION AND QUALITY OF FRESH-CUT CHERRY TOMATOES

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ABSTRACT

Fresh-cut cherry tomatoes constitute a highly desirable starting material for the production of ready to eat (RTE) meals. Their stability during refrigerated storage is limited by the exposure of the fruit's flesh to spoilage microflora[1]. Moreover, endogenous pectinolytic enzymes such as pectin methylesterase (PME) and polygalacturonase (PG) contribute to the textural deterioration of the product[2]. The extension of the shelf life of fresh-cut fruits and vegetables, important for the commercial viability of such RTE products, can be achieved by mild processes such as Osmotic Dehydration (OD). In OD water content is reduced through submersion of foods in a hypertonic solution[3]. However, water transport rates can be impractically low, depending on tissue structure. High Pressure processing (HP) icreases plant cell permeability while controlling the activity of endogenous enzymes. The effect of HP pretreatment to OD of fresh-cut cherry tomatoes was studied in order to define appropriate processing conditions that accelerate OD while maintaining product quality.

After fresh-cut tomatoes were treated at different pressures (100-600 MPa) for 5 min, PME and PG activity were measured. Samples were osmotically dehydrated in an osmotic solution containing 60% glycerol at 35°C. Measurements (water loss (WL), water activity (a_w), pH, color, firmness, sensory characteristics) were conducted at different times during processing (0-180 min). The kinetics of OD were mathematically modelled in terms of WL using Fick's second law of diffusion.

HP treatments at 100 and 200 MPa did not significantly accelerate osmotic dehydration. At pressures 100-400 MPa, firmness and peel detachment deteriorated (up to 80%) due to extensive cellular breakdown. At a pressure of 600 MPa, two positive effects were observed: firmness was retained (over 75% of the untreated), due to the inactivation of PG and retention of PME activity (3% and 100% residual activity) and dehydration was significantly accelerated (up to 2 h), leading to a product of low water activity (0.750-0.850), pH (3.7) and high sensory acceptance (exceeding 7.5/9).

Our results indicate that the application of HP is an effective pretreatment for the accelerated production of low water activity fresh-cut tomatoes with expectedly extended stability, currently being validated through shelf life modelling experiments.

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KEYWORDS: high pressure processing, osmotic dehydration, tomato

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