The effect of abiotic stress pre-treatments on quality attributes of fresh-cut carrot cv. Nantes

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INTRODUCTION

Abiotic stresses, such as heat shock and UV-C radiation, can be used to induce the synthesis of bioactive compounds and prevent decay in fresh-cut fruits and vegetables. Among the preservation techniques that are currently in use by the fresh-cut industry, e.g. antioxidants, chlorines and modified atmosphere packaging, the use of heat shock and ultraviolet-C treatments, alone or in different combinations have proved useful to control microbial growth while maintaining quality during storage of fresh-cut produce [1].

The aim of this study was to evaluate the effects of heat shock and UV-C radiation stress treatments, applied in whole carrots, on the overall quality of fresh-cut carrot cv. Nantes during storage (5 °C).

MATERIALS & METHODS

Raw whole carrots (Daucus carota L. cv. Nantes) without treatment (Ctr samples) and submitted to heat and UV pre-treatments (HS and UV samples, respectively) were subsequently minimal processed. Minimal processing (MP) included peeling, shredding, decontamination process (chlorinated water, 200 ppm/1 min), rinsing, drying and packaging operations. Heat shock was performed by immersion of whole peeled carrots in hot-water at 100 °C for 45 s and paper dried. UV-C pre-treatment were prepared in a UV-C apparatus and the whole peeled carrots were placed in a single layer for 2 min (0.78±0.36 kJ.m<sup>2</sup>). After HS and UV-C pre-treatments, the whole carrots were held at 5 °C for 24 h until minimal processing operations without the decontamination step. Analytical procedures were carried out in triplicate on five sampling dates, i.e. days 0, 3, 5, 7 and 10. Total mesophilic aerobic count (TAPC) [2], headspace gas (O<sub>2</sub>/CO<sub>2</sub> %) analysis (Abissprint), total phenolic content [3], total carotenoid [4], peroxidase (POD) [5] were determined and colour whitening index (WI) was calculated by the expression:

\[ WI = 100 - \sqrt{(100 - L^2) + a^2 + b^2} \]

Statistically significant differences (P<0.05) between samples were determined according to LSD test (ANOVA).

RESULTS & DISCUSSION

Heat shock (HS, 100 °C/45s) and UV (0.78±0.36 kJ.m<sup>2</sup>) samples had higher phenolic content and exhibit reduced POD activities during storage regarding Ctr samples (200 ppm free chlorine/1 min). All analyzed samples showed reduced carotenoid contents considering raw
material (unprocessed carrot). Nonetheless, UV samples registered a three-fold increase in carotenoid content in subsequent storage. Colour of fresh-cut carrot showed a continuous increase in W1 values during storage regardless of treatment without impairing quality acceptance. Respiratory metabolism was affected by both abiotic stress treatments since reduced O2/CO2 rates were found, more significant in HS samples. The decontamination effect of the tested stresses was more expressive in HS samples, where a = 2 Log10cfu.g⁻¹ reduction in initial microbial load was achieved and also provided reduced microbial development rate during storage. Both stress treatments show beneficial effects on the overall quality of fresh-cut carrot and proved to be more efficient than the industrial practice for fresh-cut carrot.

CONCLUSION
Both stress pre-treatments showed beneficial effects on the quality of fresh-cut shredded carrot, namely increases in phenolic and carotenoid contents and also reduced POD activity during storage. Moreover, heat shock pre-treatment promotes an effective decontamination effect and reduced respiratory levels.

REFERENCES

INTRODUCTION
Milk and milk products are a series of processes (e.g., fat content) and homogenization of the milk fat globules separation from the separation of milk to smaller. The most common alternative method extrusion ultrasound causes vitamins in the milk fat globules and the milk. Ultrasound causes vitamins in the milk fat globules to be reduced drastically in the milk. The ultrasound treated milk fermentation process is a strong gel structure, i.e., to apply ultrasound on the produce yogurt.

MATERIALS & METHODS
Raw bovine milk (± ultrasound for 10min at 85 °C for 20min, coo culture of Streptococci incubated in 45 °C until 24h. After the ultrasound treatment, fermentation pH was adjusted to 4.6, properties, hardness, r.

RESULTS & DISCUSSION
Ultrasound homogenization of milk has satisfactory homogenization at high amplitude in milk. Medium amplitude average diameter was 11th International Congress