Chemical Treatments Impact on Safety and Quality of Frozen Red Bell Pepper (*Capsicum annuum*, L.)

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Introduction

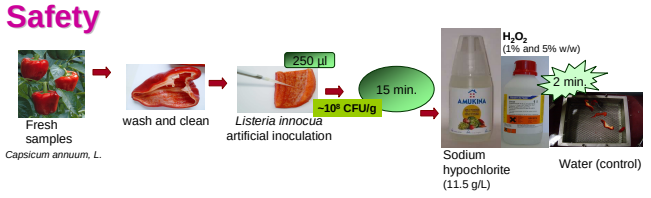
The high loads of some microorganisms in fresh fruits and vegetables, as well as the high probability of products contamination along manufacturing, justify treatments application in a phase prior to storage (both in refrigeration or frozen conditions). Thermal pre-treatments, such as blanching, are extensively used aiming at maximum safety and quality retention of frozen products. Alternatively, chemical treatments may be used as disinfectant washings of fruits and vegetables, avoiding the negative impact of the thermal treatments, while assuring safety from a microbiological point of view. Traditionally, hydrogen peroxide and chlorine solutions are used as decontamination agents.

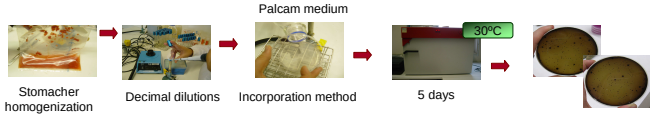
Objectives

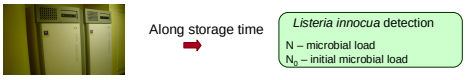
The objective of this work was to study the impact of two disinfectant solutions (***sodium hypochlorite*** - used in a commercial available solution AMUKINA, and ***hydrogen peroxide***) on safety (assessed by *Listeria innocua* artificial inoculation) and on some quality attributes (pH, colour and texture) of red bell peppers stored in frozen conditions (-7ºC and -30ºC).

Experimental description

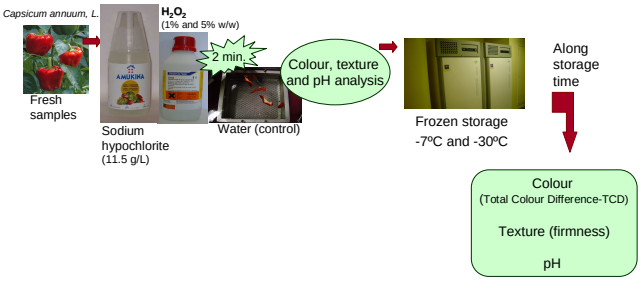
Safety







Quality

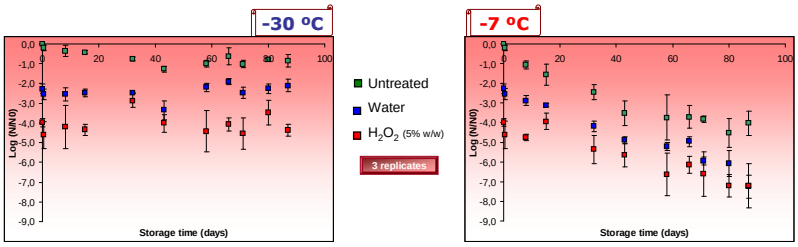


Results and Discussion

Safety

In terms of *Listeria innocua* reduction, results from water-washings were equivalent to washings with AMUKINA and hydrogen peroxide (1% w/w) solutions. This was observed throughout storage at both temperatures (results not shown).

When a water-washing was applied, a reduction of approximately 2 log-cycles was observed.
For hydrogen peroxide (5% w/w), *Listeria* reduced approximately 4 log-cycles (results presented in figures bellow). A significant effect of the storage temperature was observed at -7 ºC. As storage time increases, higher reductions were observed (with a linear tendency). The storage temperature effect was not evident at -30 ºC.



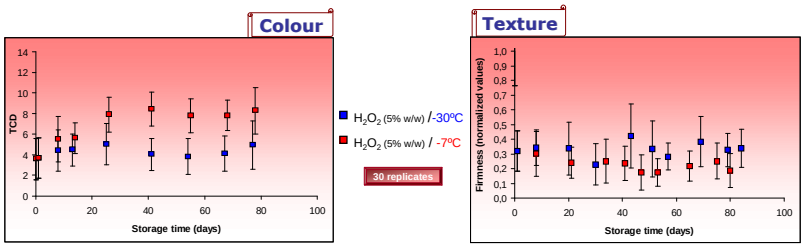
Quality

The treatments did not affect *colour*, *firmness* and *pH* of red bell peppers during frozen storage.

The storage temperature had a significant impact on ***colour*** retention (assessed by TCD). For the lowest temperature (-30 ºC), colour was better retained throughout all storage and for all disinfectants used (results of H_2O_2 solutions (5% w/w) are shown in figure bellow, as representative ones).
For the highest temperature (-7 ºC), the differences in colour were more evident than the ones observed at -30 ºC. These differences were significant after 25th day of storage (the difference average 4 units of TCD parameter).

Firmness was not affected by the storage temperature (results of H_2O_2 solutions (5% w/w) are shown in figure bellow, as representative ones).

pH was not affected by frozen storage (results not shown).



Conclusions

If ***hydrogen peroxide solutions*** (at 5% w/w) are used in red bell peppers washing, significant reductions of *Listeria innocua* were observed *post*-treatment and during frozen storage.

The disinfectant solutions did not affect the quality parameters analyzed throughout frozen storage.

Acknowledgments
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