

Plasma activated water (PAW) for washing perishables to gently reduce the microbial load and the chemistry behind it.

RIBEIRO L. (1), SEVENICH R. (1), SCHLER O. (1)

1 Quality and Safety of Food and Feed, Department of Horticultural Engineering, Leibniz Institute for Agricultural Engineering and Bioeconomy, Potsdam, Germany

Minimally processed perishables have gained attention in recent years, due to the convenience and health aspects, which attract the attention of a growing public, who are looking for nutritional benefits in addition to practicality. Therefore, the aim of this research was to investigate the potential of plasma-activated water (PAW) at different temperatures to reduce the microbial load on perishables as well as the chemistry behind it (stability and duration of usability of the PAW.)

Cherry tomatoes, lettuce, apple and pears were treated with PAW at 20°C, 30°C and 40 °C for 1 to 5 minutes or tap water and stored for 2 weeks at 8°C. Directly after the treatment as well as for each storage point the microbiology was tested via plating dilutions on Endo agar (Enterobacteriaceae), Maltodextrose agar (Yeasts and molds) and plate count agar (total aerobic mesophilic). The concentrations of H₂O₂, NO₂⁻ and produced in PAW were measured via The Amplex® Red Hydrogen Peroxide Assay Kit (H₂O₂) and the Nitrate/Nitrite colorimetric assay (NO₂⁻). pH and the conductivity were also evaluated.

Based on preliminary results it was decided that a treatment of 3 min with PAW at 30°C as the optimal condition. The mentioned results are in comparison to the control and tap water sample. For the tomatoes a reduction of ~3 log₁₀ (molds, Enterobacteriaceae, mesophilic bacteria) was achieved. A similar inactivation was noticeable for the lettuce 1.4 log₁₀ for mesophilic bacteria, 2.1 log₁₀ for Enterobacteriaceae and 2.9 log₁₀ for molds. Also for the apples, a reduction of 1.5 log₁₀ for mesophilic bacteria, 1.5 log₁₀ for Enterobacteriaceae and 3.3 log₁₀ for molds was achieved. For the pears, similar results as for apple were obtained. These reductions were stable over the storage period. Currently, the chemistry of the PAW is still under investigation.

PAW is a new and great addition for the sanitization of perishables, showing a good potential on the microbial inactivation. Its chemistry and usability need further investigation.