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

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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 platting dilutions on Endo agar (Enterobacteriaceae), Maltodextrose agar (Yeats 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.