

## Application of frozen plasma-activated water to sanitize and precool fresh produce during postharvest handling process

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Converting plasma-activated water (PAW) to frozen PAW (FPAW) imparts additional advantages, for it can simultaneously conduct washing, pre-cooling, and decontaminating when incorporated with water. This study investigates the efficacy of FPAW undergoing pH adjustment on decontaminating *E. coli* and *S. aureus* inoculated on okra and strawberries surfaces. The effects of two different types of PAW (fresh and FPAW) dissolved in water and immersion time (0, 10, 15, and 20 min) on PAW efficacy in combination with the surface properties of okra and strawberries are investigated. Even though the bacterial reduction achieved by this study was generally lower than the treatment applied to planktonic *E. coli* and *S. aureus*, the efficacy of FPAW was not entirely eliminated by the surface roughness of the treated product and other intertwining factors. Log reductions  $>2.5$  and  $>1.0$  for *E. coli* and *S. aureus* were achieved, respectively, indicate that pH-adjusted-FPAW has the potential to be applied in the postharvest treatment of fresh produce. In addition, the treatment applied did not significantly affect the physical quality of the product; in fact, the precooling effects of frozen PAW prevent the chilling injury on okra stored at  $4.5 \pm 0.5$  °C for 10 days.