

Title UV-C doses to reduce pathogen and spoilage bacterial growth *in vitro* and in baby spinach
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Abstract

The aim of this work was to investigate the use of different doses of UV-C (0, 2.4, 7.2, 12 and 24 kJ m⁻²) radiation treatments to inhibit microbial growth of *Listeria monocytogenes* and *Salmonella enterica*. The spoilage bacteria *Pseudomonas marginalis* (gram negative) was also tested. These bacteria were studied under *in vitro* conditions and in baby spinach leaves (*in vivo* conditions) for 13 and 14 d at 5 °C, respectively. All radiation doses were effective in reducing bacterial growth, although contrary to expectations, high doses did not show the highest microbial inhibition in *in vitro* experiments. UV-C doses (2.4–24 kJ m⁻²) were also used on baby spinach (*Spinacia oleracea* L.) leaf surfaces, stored under humidified air using perforated plastic film. A clear inhibitory UV-C effect was observed on *L. monocytogenes* for 14 d at 5 °C. Meanwhile, UV-C radiation reduced *S. enterica* loads until the first 4 d of storage, after which a significant increase was found on radiated leaves compared to the control. *P. marginalis* counts were slightly reduced in UV-C treated leaves. In addition, significant decreases in psychrotrophic counts and *Enterobacteriaceae* were found during the first 4 d of storage. Respiration rates of baby spinach leaves were higher in radiated than in non-radiated leaves. Moreover, no obvious damage on the epidermal surface and to cell shape was detected in radiated and non-radiated leaves by scanning electronic microscopy (SEM). In summary, the use of double-sided UV-C radiation, at low doses, was effective in reducing initial microbial counts of the tested bacteria types and psychrotrophic and *Enterobacteria* counts, and in keeping *L. monocytogenes* at low levels during the storage period, without affecting the sensory quality of fresh-cut baby spinach leaves.