

Title Effectiveness of two-sided UV-C treatments in inhibiting natural microflora and extending the shelf-life of minimally processed 'Red Oak Leaf' lettuce

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Abstract

The use of UV-C radiation treatments to inhibit the microbial growth and extend the shelf-life of minimally processed 'Red Oak Leaf' lettuce was investigated. Initially, UV-C resistance of 20 bacterial strains from different genera often associated with fresh produce (*Enterobacter*, *Erwinia*, *Escherichia*, *Leuconostoc*, *Pantoea*, *Pseudomonas*, *Rahnella*, *Salmonella*, *Serratia* and *Yersinia*) were tested in vitro. Most of the bacterial strains were inhibited with the minimum dose (30 J m^{-2}). *Erwinia carotovora*, *Leuconostoc carnosum*, *Salmonella typhimurium*, and *Yersinia aldovae* were the most resistant strains requiring a UV-C dose of 85 J m^{-2} to completely inhibit growth. An in vivo study consisted of treating minimally processed 'Red Oak Leaf' lettuce (*Lactuca sativa*) with UV-C at three radiation doses (1.18 , 2.37 and 7.11 kJ m^{-2}) on each side of the leaves and storing the product under passive MAP conditions at 5°C for up to 10 days. The gas composition inside packages varied significantly among the treatments, with CO_2 concentrations positively and O_2 concentrations negatively correlating with the radiation dose. All the radiation doses were effective in reducing the natural microflora of the product, although the highest doses showed the greatest microbial inhibitions. Taking into account the microbial limit set by Spanish legislation [Boletín Oficial del Estado (BOE), 2001. Normas de higiene para la elaboración, distribución y comercio de comidas preparadas, Madrid, Spain, Real Decreto 3484/2000, pp. 1435–1441], all UV-C treatments extended the shelf-life of the product. However, the 7.11 kJ m^{-2} dose induced tissue softening and browning after 7 days of storage at 5°C . Therefore, the use of two sided UV-C radiation, at the proper dose, is effective in reducing the natural microflora and extending the shelf-life of minimally processed 'Red Oak Leaf' lettuce.