Title Effects of electron-beam irradiation on the shelf life, microbial populations and sensory characteristics of summer truffles (*Tuber aestivum*) packaged under modified atmospheres

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Abstract

The effects of two doses of electron-beam irradiation (1.5 kGy and 2.5 kGy) on the microbial populations (total mesophilic aerobes, *Pseudomonas* genus, Enterobacteriaceae family, molds and yeasts) and sensory characteristics of *Tuber aestivum* packaged under modified atmospheres were monitored immediately after treatment, and weekly during 42 days of storage at 4 °C. Treatment with 1.5 and 2.5 kGy reduced the pseudomonads populations by 4.3 and 5.5 logs, respectively. Enterobacteriaceae counts decreased by 5.4 logs with the 1.5 kGy dose and counts below the detection limit (<1.0 log cfu/g) were obtained with the 2.5 kGy dose. Lactic acid bacteria and yeasts were less affected by the ionizing radiation treatments and they became the dominant microbial populations throughout storage with microbial counts up to 7.1 log cfu/g. The carbon dioxide levels inside the packages containing irradiated truffles were lower than those of the non-irradiated ones, suggesting a decrease in the respiration rate of the treated ascocarps. The treatments with 1.5 and 2.5 kGy e-beam did not negatively affect the sensory characteristics of truffles, but a visible superficial yeast growth was detected in truffles irradiated with 1.5 kGy at the end of their shelf life (day 28). Treatment with 2.5 kGy e-beam has prolonged the shelf life to 42 days, compared with 21 days for the untreated samples.