

**Title** Effects of electron-beam and gamma irradiation treatments on the microbial populations, respiratory activity and sensory characteristics of *Tuber melanosporum* truffles packaged under modified atmospheres

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### Abstract

The effects of electron-beam or gamma irradiation (doses of 1.5 kGy and 2.5 kGy of either one) on the microbial populations, respiratory activity and sensory characteristics of *Tuber melanosporum* packaged under modified atmospheres were monitored immediately after treatment, and subsequently every seven days during 35 days of storage at 4 °C. Treatments with 1.5 and 2.5 kGy reduced the total mesophilic aerobes counts respectively by 4.3 and 5.6 log cfu/g for electron-beam treatment, and by 6.4 and 6.6 log cfu/g for gamma irradiation. Other microbial groups studied (*Pseudomonas* genus, Enterobacteriaceae family, lactic acid bacteria, mesophilic aerobic spores, molds and yeasts) were not detected after the treatments. A decrease in the respiratory activity was detected in all the irradiated batches, indicating that the carbon dioxide levels were lower and the oxygen levels higher than those of the non-irradiated ones. Two species of yeasts, *Candida sake* and *Candida membranifaciens* var. *santamariae*, survived the irradiation treatments and became the dominant microbial populations with counts of up to 7.0 log cfu/g. The growth of these microorganisms was visible on the surface of irradiated truffles from day 21 onwards, affecting the flavor and the general acceptability of the ascocarps. Moreover, a watery exudate was detected in the treated truffles from the third week onwards, so the application of irradiation treatments in doses equal to or above 1.5 kGy did not preserve the quality characteristics of *T. melanosporum* truffles beyond 28 days.