Influence of postharvest gamma irradiation on the antioxidant system, microbial and shelf life quality of three cultivars of date fruits (*Phoenix dactylifera* L.)

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## Abstract

The aim of this study was to evaluate the effects of gamma irradiation on the physicochemical properties, microbial load and storage life of three date fruit cultivars. Gamma irradiation was directed at semi-dry date fruits of the 'Piarom' cultivar and also at the dry date fruits of the 'Zahedi' and 'Deiri' cultivars. The irradiation treatment was carried out at three doses, i.e. 1, 3 and 5 kG, in a 60C° chamber. Then, the date fruits were stored at 25 ± 2 °C for 4 months. At the end of the storage, the treated samples showed a higher total soluble solid compared to the control. Over time, the moisture content of the samples decreased. However, among all cultivars, the 'Zahedi' cultivar had a higher moisture content than the control. Through the storage time, the total phenolic content was reduced, but irradiation had a significant effect on maintaining the total phenolic content of the samples. Comparing the three cultivars, the highest flavonoid content was observed in 'Piarom' samples (26.82 mg CEQ/g FW). Furthermore, the 'Piarom' cultivar exhibited higher levels of antioxidant capacity, peroxidase enzyme, ascorbate peroxidase, sensory attributes (color, flavor, texture, smell and overall acceptability) and fungal load, compared to the other two cultivars. The irradiation treatment caused the retention of the total antioxidant content, fungal load, sensory attributes, pH value and peroxidase enzyme. In addition, the irradiation dose of 5 kG appeared to be an optimal dose for decontamination and the maintenance of date fruit quality. In general, the present study indicated that the efficiency of gamma irradiation can be substantial for the postharvest maintenance of quality among dates. The treatments can assist horticulturists in preventing the deterioration of nutritional contents and the hygienic condition of fruits. This opens opportunities for future methods of disinfection that can reduce the occurrence of contamination