

Title Disinfestation of dates using electron beams in comparison with other treatments
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Abstract

In this study electron-beams were applied to disinfestate dates through using 5 different energy/doses and comparing disinfestation efficacy such as insect mortality and hatches with microwave, steaming and fumigation by phostoxin. The percentage of mortality was 100% for all electron-beam treatments, also hatches were less (0-1) compared to microwave, steaming and fumigation. The treated dates' quality was assessed by measuring moisture content, water activity, color, total viable count (TVC), yeast and mould count (YMC) and antioxidant capacity. There was no difference in moisture content between control and other treated samples except for steaming and fumigation, whereas moisture increased to 14.59 and 15.07 g/100 g respectively. Alike to the changes pattern of the moisture content, the steam treatments as well as the fumigated samples reveal a slight increase in the water activity. Color lightness was lowest in the steaming sample (20.36); conversely, it remains almost unchanged through other treatments. Electron beams (1.5 MeV/1.0 kGy and 1.5 MeV/2.0 kGy) had the lowest TVC (1.65 and 1.70 log cfus/g), and also YMC was low in samples treated by electron beams in comparison with other treatments. There were no significant differences in antioxidant capacity between all treatments, except for the sample treated by electron beams 1.5 MeV/ 2.0 kGy, antioxidant capacity was reduced to 232 $\mu\text{mol/g}$. EPR free radicals generation (g-value) measurements through alanine dosimetry were 1×10^{-8} mol/J lower than the alanine (3×10^{-7} mol/J).