

**Title** Surface decontamination of fig fruit by combination of infrared radiation heating with ultraviolet irradiation

**Author** Daisuke Hamanaka, Naoko Norimura, Noriko Baba, Kozo Mano, Makoto Kakiuchi, Fumihiko Tanaka and Toshitaka Uchino

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### **Abstract**

The application of single and sequential treatments of infrared radiation (IR) heating and ultraviolet (UV) irradiation to surface decontamination was investigated in relation to extending the shelf life of fig fruits. In addition, the inactivation effects of IR heating or UV irradiation, and their sequential treatments on fig fruit related yeast were also investigated. The sequential treatment of IR heating and UV irradiation was effective in the surface decontamination of fig fruits. The fungal counts detected after sequential treatments were lower than those obtained after a single treatment or in control samples. The number of fruits damaged by the growth of mold and yeast was also reduced after 30 s IR heating followed by 30 s UV irradiation. The sequential treatment was found to be highly suitable for decontamination of fig fruit surface, since few unfavorable effects were observed with regard to the surface color, hardness score, and respiration of fruits during storage. Single treatment with IR heating or UV irradiation had little effect on the inactivation of isolated *Rhodotorula mucilaginosa* cells. However, *R. mucilaginosa* cells were successfully inactivated by sequential treatment with IR and UV. The killing efficiencies appeared to be independent of the order in which IR heating and UV irradiation were applied to the samples. It was hypothesized that the DNA damage caused by UV irradiation and the inhibition of its repair might be enhanced by the thermal energy of IR heating to a sub-lethal level, since the temperature monitored during IR heating was considerably lower than the lethal level of *R. mucilaginosa* cells.