

# SHORT WAVE ULTRAVIOLET LIGHT (UVC) DISINFECTION OF SURFACE – INHIBITION OF *ALICYCLOBACILLUS ACIDOTERRESTRIS* SPORES ON AGAR MEDIUM

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*Alicyclobacillus* species are thermoacidophilic spoilage spore-formers found in soil. The spores can survive the normal hot fill processes that are carried out on commercial fruit juices. It seems likely that fruit in contact with soil are susceptible to contamination by *Alicyclobacillus*. Beverage ingredients e.g. liquid sugar are also a potential contamination sources. *Alicyclobacillus* has also been isolated from citrus processing lines. Ultraviolet irradiation is a potential alternative for chemical disinfection. Short-wave ultraviolet light irradiation (UVC) has been reported to be effective in inactivating bacteria that contaminate water and material surfaces. The effects of 254-nm UVC were investigated on spores of *A. acidoterrestris* DSM 3922 on agar plates. Agar plates inoculated with *A. acidoterrestris* spores in levels of  $10^3$ – $10^5$  cfu, which were recovered from inoculated slants by washing the culture surface with sterile water, were subjected to UV light. The effects of UVC on the growth response of *A. acidoterrestris* spores were determined after different exposure times individually. The inoculation was made on medium containing glucose, yeast extract,  $\text{KH}_2\text{PO}_4$ ,  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ,  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ ,  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ,  $\text{MgCl}_2 \cdot 4\text{H}_2\text{O}$ ,  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ , trace element and deionised water. The inoculated ( $10^3$ – $10^5$  CFU or spores/ml) plates were placed under the UV-lamp (30 W, 254.3 nm), and exposed to UVC treatment in intervals of 10 s to 5 min. Two plates were UVC treated, while one plate served as control. The UV intensity at the surface of the sample was measured using a radiometer with UVX-25 sensor (UVX, UVP Inc., CA, USA) calibrated by reference to a National Institute of Standards and Technology. The UV lamp was switched on for about 30 min prior to UV treatment of inoculated agar plates in order to minimise fluctuations in intensity. The UV intensity was kept constant at  $1315 \mu\text{W}/\text{cm}^2$ . The UV irradiation of samples was conducted using a collimated beam apparatus

consisted of a UV-lamp (UVP XX-15, UVP Inc., CA, USA). The UV radiation was collimated with a flat black painted tube. The controls and UVC treated plates were incubated 43°C up to 120 h and observed for colony formation. This experiment was repeated twice. UVC light treatment of inoculated plates revealed almost complete elimination (99.9%) of spores of *A. acidoterrestris* DSM 3922 at 1315  $\mu\text{W}/\text{cm}^2$ . The results of this study indicate that UVC light inactivation can induce a 5-log reduction of spores of *A. acidoterrestris* on agar plates. In conclusion, UVC light can be used in disinfection of surfaces and fruit juice processing lines. Our results encourage further studies to elucidate the effect of UVC as surface disinfectant and to demonstrate inactivation of a wide spectrum of microbes using different UV-doses.