SPORES PREPARATIONS OF BACTERIAL INACTIVATION WITH Co⁶⁰ AND PRESERVATION OF ENDOTOXINS ENTOMOPATHOGENIC ACTIVITY

Authors: Lima, V.C.P., Rabinovitch, L., Vivoni, A.M., Santos, M.A.V.M., Lopes, R.T.

Institution: ¹FIOCRUZ-MS-Institute Oswaldo Cruz, Laboratory of Bacterial Physiology (Av. Brasil nº 4360, zip code: 21040-900 Manguinhos, Rio de Janeiro, Brazil). ²CPqAM/Fiocruz-Research Center Aggeu Magellan, Laboratory of Entomology (Av. Professor Moraes Rego s/n, zipcode: 50.740-465 Campus da Federal University of Pernambuco-UFPE, Recife, Brazil). ³COPPE-UFRJ-Nuclear Engineering Program, (Av. Pedro Calmon 550-University City, Federal University of Rio de Janeiro, Brazil).

Abstract:

Some Bacillus thuringiensis (Bti) serotypes and Lysinibacillus sphaericus strains (Ls) are used in insecticides larvicides preparations active against Culicidae and Simuliidae. In most of these traditional commercial liquid insecticides (presented under different formulations containing organic acids, thickeners, preservatives, emulsifiers, disintegrants and water) bacterial spores are present, along with the toxins, since they are thought to be harmless to men and most animals. However, some users prefer bacterial larvicides commercial products free of viable spores, for environmental applications in large scale. However, the inactivation of spores in these preparations creates new expectations in users regard it improved security for living beings. Studies show that Co⁶⁰ (4.86 n⁻¹; factor 1:13) inactivate spores leaving the active protoxins. In a previous work developed at the Bacterial Physiology Laboratory (2014) it was found that 20 kGy promoted inactivation of the spores present in formulated Bti IPS-82 (initial average spore counting in the order of 3.50x10⁶ CFU / mg, equivalent to Log N = 0). In this study, we used the sporulated Ls 2362 lineage with intracytoplasmic endotoxins present, in the same excipient of the previous formulation. Its spores showed sensitivity to heat resistance at 80°C, a fact not observed with spores of the lineage of Bti IPS-82, which forced the work to 70°C temperature with this lineage. The Co⁶⁰ radiation applied to the Ls formulated biomass, starting with mean values of 1.86 CFU / mL (as spores), showed that complete inactivation of Ls 2362 occurred with 12.5 kGy. These findings show significant difference in results obtained with BtiIPS-82. Experiments with new formulations of entomopathogenic aerobic spore-forming bacteria are being carried out to confirm this finding in other serotypes.

Keywords: Bacillus thuringiensis; Lysinibacillus sphaericus; entomopathogenic; aerobic spore; Co⁶⁰, irradiation; Simuliidae