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The potential of atmospheric air cold plasma for control of bacterial contaminants relevant to cereal grain production

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Abstract

The aim of this work was to investigate the efficacy of dielectric barrier discharge atmospheric cold plasma (DBD ACP) against bacteria associated with grains quality and safety. ACP inactivation efficacy was tested against biofilms formed by different strains of *E. coli*, *Bacillus* and *Lactobacillus* in grain model media and against *B. atrophaeus* endospores either in grain media or attached on abiotic surfaces. Effects were dependent on bacterial strain, media composition and mode of ACP exposure. ACP treatment for 5 min reduced *E. coli* spp., *B. subtilis* and *Lactobacillus* spp. biofilms by >3 log, whereas insignificant reductions were achieved for *B. atrophaeus*. ACP treatment of 5 – 20 min reduced *B. atrophaeus* spores in liquids by >5 log. Treatment for 30 min reduced spores on hydrophobic surface by >6 log, whereas maximum of 4.4 log reductions were achieved with spores attached to hydrophilic surface. Microscopy demonstrated that ACP caused significant damage to spores. In package ACP treatment has potential to inactivate grain contaminants in the form of biofilms, as well as spores and vegetative cells.

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