Cold plasma inactivation of naturally occurring fungi, artificially inoculated Fusarium graminearium and associated mycotoxins in wheat grain

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Biography:

Maninder Kaur is a PhD student at Murdoch University, researching the application of cold plasma technology to postharvest cereal grain to manage Fusarium graminearum contamination and associated mycotoxin production. Her work is supported by a Department of Primary Industries and Regional Development scholarship and supervised by Daniel Huberli (DPIRD) and Kirsty Bayliss from Murdoch University, Australia.

Abstract:

Fusarium graminearum is a pathogen of wheat grain that causes reductions in yield and grain quality, globally. It is also a known mycotoxin producer. With the unreliability of current management practices for F. graminearum, an alternative and effective approach is needed which does not have phytotoxic effects on the grain. In this study, cold plasma was used to treat naturally occurring fungi and artificially inoculated F. graminearum on postharvest wheat grain. For naturally occurring fungi, grain at two moisture levels, 11 % and 16 % were treated with cold plasma for 60 s or 180 s, and the inactivation of internal and surface fungi was recorded. For artificial inoculation of F. graminearum, a lower moisture content level of 11 % was selected to represent Australian grain storage conditions. Grain at 11 % moisture content were inoculated with conidial suspensions of four F. graminearum isolates and then treated with cold plasma for 60 s or 180 s. Wheat grain at the same moisture content were also inoculated with the mycotoxin Deoxynivalenol (DON) and treated. It was demonstrated that the 180 s cold plasma treatment of grain at 16 % moisture content significantly reduced the growth rate of naturally occurring surface fungi compared to untreated controls. Similarly, the longer treatment significantly reduced the growth rate of all F. graminearum isolates on wheat grain and also reduced the total number of infected grain, with up to 66 % reduction in colony-forming units. The full results of the trial, including DON inactivation, will be presented, and their implications discussed.