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Abstract

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Evaluation of rapid test kits as potential screening tools for Ochratoxin A (OA) determination in wheat and barley

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Abstract

Existing validated laboratory test procedures for Ochratoxin A (OA) analysis are accurate and sensitive but not ideally suited to routine screening due to their time consuming nature and the necessary investment required in specialist personnel and sophisticated laboratory instrumentation. The aim of this project was to survey the scientific literature to identify rapid test approaches and to evaluate tests having the potential to screen wheat and barley samples for OA contamination.

A literature search identified that rapid test kits based on antibody capture of OA molecules and colorimetric or UV detection were the only commercially available rapid test kits suitable for purpose. Kits based on lateral flow devices (LFDs), that behave in a similar manner to pregnancy test kits, proved to be the simplest to use, exhibited acceptable levels of repeatability and reproducibility and provided consistent analytical data for screening at a defined threshold concentration of 3 or 4 parts per billion (ppb) (Ochratoxin A, BioControl Systems Diagnostics Ltd as an example). One fully quantitative LFD-style test kit (ROSA® Ochratoxin (Quantitative) Test, Charm Sciences Inc.) was also tested and shown to be fit for purpose. The microtiter plate-based assays (Veratox for Ochratoxin, Neogen Europe and Ridascreen® Ochratoxin A 30/15, r-Biopharm-rhône) provided the facility to analyse samples using calibrations applicable to screening at different legislative limits but the analysis of batched samples took several hours to produce a set of results and it might be argued that these approaches do not strictly conform to the definition of rapid tests. Test kits based on the use of immuno-affinity (IMA) columns and UV detection (Ochracard P48, r-Biopharm-rhône and Ochrascan, r-Biopharm-rhône) were also evaluated. In general, these kits required more time-consuming or complex approaches for sample preparation and were not found to provide compensating advantages.

The overall conclusion from the evaluation was that all test kits selected were capable of detecting OA in ground wheat and barley samples, conforming to manufacturers' stated claims and fulfilling the requirements of being "fit for purpose." However, repeatability and reproducibility of data remain a major challenge to the analysis of OA because the detection of OA contamination in wheat and barley has a much greater dependence on the sampling regime than is the case for other cereal mycotoxins, e.g. deoxynivalenol (DON).