

Title Application of near infrared spectroscopy for rapid detection of aflatoxin B1 in maize and barley as analytical quality assessment

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Abstract

The establishment of fast and non-destructive methods for the evaluation of quality and safety of raw grains is being demanded nowadays to avoid toxic substance presence. Aflatoxin B1 (AFB1) has been recognised by the International Agency of Research on Cancer as a group 1 carcinogen for animals and humans and the EU Official Journal has established action levels for AFB1 presence in all feed materials between 5 and 20 ppb. Near infrared spectroscopy (NIRS) is an excellent candidate for a rapid and low-cost method for the detection of aflatoxins in cereals. This study assesses the utility of NIRS for rapid detection of mycotoxigenic fungi as AFB1. A total of 152 samples were involved and analysed for aflatoxin content. The results of spectroscopic models developed have demonstrated that NIRS technology is an excellent alternative for fast AFB1 detection in cereals. The best predictive model to detect AFB1 in maize was obtained using standard normal variate and detrending (SNVD) as scatter correction ($r^2 = 0.80$ and 0.82 ; $SECV = 0.211$ and 0.200 for grating and FT-NIRS instruments, respectively). In the case of barley, the best predictive model was developed using SNVD on the dispersive NIRS instrument ($r^2 = 0.85$ and $SECV = 0.176$) and using spectral data as log 1/R for FT-NIRS ($r^2 = 0.84$ and $SECV = 0.183$).