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# Detection of *Fusarium* in single wheat kernels using spectral imaging

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## Summary

*Fusarium* head blight (FHB) is a harmful fungal disease that occurs in small grains. Non-destructive detection of this disease is traditionally done using spectroscopy or image processing. In this paper the combination of these two in the form of spectral imaging is evaluated. Transmission spectral images are recorded, both in the visible and near-infrared range from FHB infected wheat kernels. These images are analyzed, using light absorption, the relation between two wavelength bands, unsupervised fuzzy c-means clustering and supervised partial least squares regression. The reference method for training and validation is TaqMan real-time PCR. Results show that near-infrared spectral images perform much better than spectral images in the visible range. Kernels with more than 6000 pg *Fusarium* DNA could clearly be identified. Above 100 pg it was possible to predict the amount of *Fusarium* with a $Q^2$ of 0.8. This was both for Partial Least Squares regression (PLS) and a simple wavelength ratio. Also fuzzy c-means clustering shows a relation between amount of *Fusarium* and spectra.